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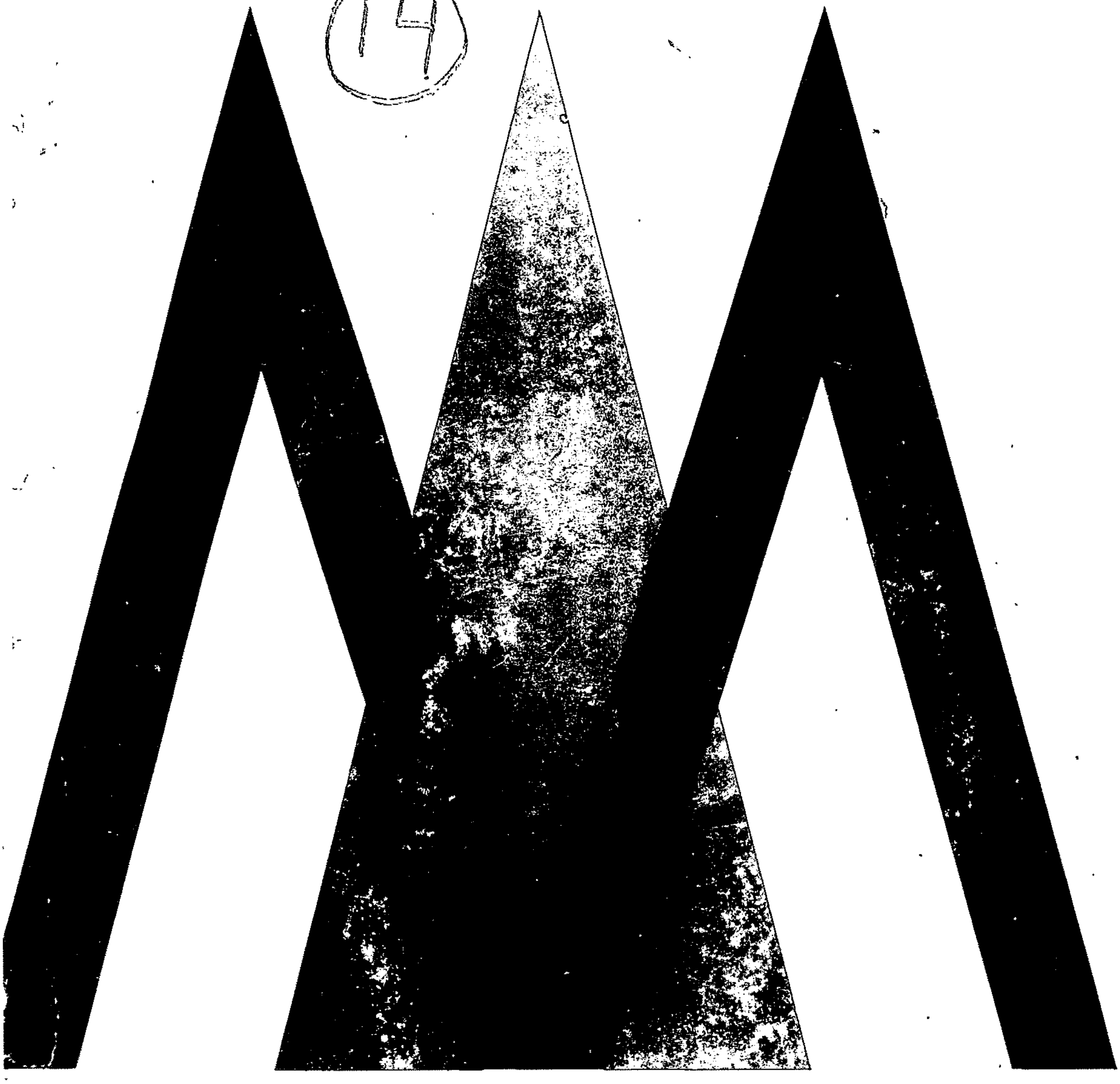

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Submissions should be sent to Professor Richard T. Mowday, *Academy of Management Journal*, College of Business Administration, University of Oregon, Eugene, Oregon 97403-1208.

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FROM THE EDITOR

With this issue, the *Academy of Management Journal* enters its 31st year of regular publication. The history of the *Journal* has been one of remarkable growth, as anyone who examines the very first regular issue published in April 1958 will appreciate. What began as a somewhat controversial effort to provide a vehicle for communication among Academy members, largely focusing on teaching and curriculum issues, has grown into a journal that is one of the most important and widely respected outlets for scholarly research on management.

The reputation for high quality that *AMJ* has achieved is due to the efforts of many people, including the authors who have published their work in it, the countless editorial review board members and ad hoc reviewers who have volunteered their time, and the individuals who have preceded me as editor. While space does not permit listing authors or reviewers in this issue, I would like to recognize the ten people who have previously served as editor. I have worked directly with several of these individuals, much to my personal benefit. The recognition of the previous editors at the end of this editorial is a token of our appreciation for their tireless and conscientious efforts to make *AMJ* one of the most highly respected management journals.

I am particularly indebted to Janice M. Beyer, the outgoing editor. The three years I have worked with Jan as a consulting editor have been among the most rewarding of my career. Jan has been a teacher, colleague, and friend. Moreover, the *Journal* has prospered under her leadership. Both the number of submissions and the quality of articles published in the *Journal* have increased over the past three years. Not only has Jan handed over a journal that is in outstanding shape, she has made every effort to ease my transition into the role of editor. Jan can be very proud of the job she has done as editor. We all owe her a tremendous debt of gratitude.

I do not plan major editorial changes during the term of my editorship. Instead, I see my job as continuing in the tradition of my predecessors to improve the quality of the *Journal* by attracting the best manuscripts, selecting the highest quality papers from among those submitted, and helping authors develop and communicate their research. I am joined in this effort by a number of individuals who have generously agreed to serve the *Journal*. John Fossum, Michael Hitt, and Claudia Schoonhoven have accepted my invitation to serve as consulting editors. An important part of their duties will involve working with authors in developing manuscripts that are under revision. The 35 people listed on the masthead of the *Journal* comprise the initial editorial review board. I anticipate that the size of the board will eventually increase to 50 people, with about half being new members. Additional appointments to the board will be made when I gain a better understanding of manuscript flow across different areas and after I have had a chance to become more familiar with the work done by various ad hoc reviewers.

The continuity I hope to maintain in the *Journal* is strengthened by the willingness of Steve Gomes, Production Editor, Persephone Doliner, Copy Editor, and Nancy Dodd, Index Editor, to stay on during the term of my editorship. These individuals have made outstanding contributions to the *Journal* during the past three years and I look forward to working more closely with each of them.

At the time of my appointment as editor, I did not anticipate how much work would be involved in starting a journal office and in implementing the policies and procedures to ensure its smooth operation. I have been assisted in this task by Dorothy Wynkoop. During the time she has worked at the University of Oregon, Dorothy has served the Academy in a variety of capacities. Her experience, professionalism, and enthusiasm have proven invaluable during the period when the *Journal* office was being established. Moving the *Journal* office to the University of Oregon would also not have been possible without the generous support and encouragement of my Dean, James E. Reinmuth.

While the editorial policy and style guide for submissions remain essentially unchanged, there are a few words of advice I would like to pass along to potential contributors.

1. *AMJ* strives to serve the diverse needs and specialized interests of the various divisions and interest groups within the Academy. However, we do not encourage papers that are so specialized, technical, or narrowly focused as to be uninformative or potentially uninteresting to the general membership. These papers may be more appropriately submitted to a technical journal. Instead, *AMJ* wishes to publish papers that make important contributions to general management and that communicate clearly to the broader membership. In particular, we are interested in papers that span divisional boundaries, report innovative efforts to integrate diverse theoretical and methodological approaches, and focus on important and timely topics with implications for management.

2. Far too many manuscripts are submitted in such a preliminary stage of development that it is impossible for us to judge the true worth of the ideas and research presented. With the large number of submissions that we receive, we cannot justify spending the time and effort required to bring these manuscripts up to a level suitable for publication. Authors are strongly encouraged to submit their work to critical review by their colleagues prior to submission. Papers are generally not ready for submission until they have been extensively reviewed by colleagues and have undergone several revisions. In our experience, authors who have attempted to substitute review by the editorial board for the peer review process have simply not been as successful in getting their papers published.

3. The policy of *AMJ* is to provide authors with a blind and anonymous review of their work. Authors are encouraged to assist us in maintaining a blind review process by eliminating obvious self-citations that can help to identify them. Self-citations should be used sparingly and then only when necessary.

4. Questions often arise from editorial board members when a submission is part of a larger research project or is closely related to another paper that is unpublished or under consideration at another journal. When self-citations are taken out of a paper to ensure blind review, board members are placed in the frustrating position of not having access to other work relevant to evaluating the current submission. In these situations, authors are encouraged to share related papers with the editor, who will hold them in the strictest confidence. Moreover, authors are encouraged to articulate how their work relates to papers they may have previously published or builds upon and extends an established line of research. This can be done in the letter of transmittal when the paper is submitted.

As I begin my editorship, I continue to be impressed by the fact that the success of *AMJ* depends on the contributions of many individuals who give freely of their time and expertise. To the individuals who have agreed to serve as consulting editors, board members, or ad hoc reviewers, I extend my sincere appreciation. To the authors who have already submitted their work or who plan to do so, I look forward to working with you.

R.T.M.

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TIME AND TRANSITION IN WORK TEAMS: TOWARD A NEW MODEL OF GROUP DEVELOPMENT

CONNIE J. G. GERSICK
University of California, Los Angeles

This study of the complete life-spans of eight naturally-ocurring teams began with the unexpected finding that several project groups, studied for another purpose, did not accomplish their work by progressing gradually through a universal series of stages, as traditional group development models would predict. Instead, teams progressed in a pattern of "punctuated equilibrium," through alternating inertia and revolution in the behaviors and themes through which they approached their work. The findings also suggested that groups' progress was triggered more by members' awareness of time and deadlines than by completion of an absolute amount of work in a specific developmental stage. The paper proposes a new model of group development that encompasses the timing and mechanisms of change as well as groups' dynamic relations with their contexts. Implications for theory, research, and practice are drawn.

Groups are essential management tools. Organizations use teams to put novel combinations of people to work on novel problems and use committees to deal with especially critical decisions; indeed, organizations largely consist of permanent and temporary groups (Huse & Cummings, 1985). Given the importance of group management, there is a curious gap in researchers' use of existing knowledge. For years, researchers studying group development—the path a group takes over its life-span toward the accomplishment of its main tasks—have reported that groups change predictably over time. This information suggests that, to understand what makes groups work effectively, both theorists and managers ought to take change over time into account. However, little group-effectiveness research has done so (McGrath, 1986).

One reason for the gap may lie in what is unknown about group development. Traditional models shed little light on the triggers or mechanisms of change or on the role of a group's environment in its development. Both areas are of key importance to group effectiveness (Gladstein, 1984; Goodstein & Dovico, 1979; McGrath, 1986). This hypothesis-generating study,

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I am grateful to Richard Hackman, Kelin Gersick, David Berg, Lee Clarke, Barbara Lawrence, William McKelvey, and several anonymous journal reviewers for their helpful comments on earlier drafts of this work. This research was supported in part by the Organizational Effectiveness Research Program, Office of Naval Research, under contract to Yale University.

stimulated by an unexpected set of empirical findings, proposed a new way to conceptualize group development. It is based on a different paradigm of change than that which underlies traditional models, and it addresses the timing and mechanisms of change and groups' dynamic relations with their environments.

TRADITIONAL MODELS OF GROUP DEVELOPMENT

There have been two main streams of research and theory about group development. The first stream deals with group dynamics, the other with phases in group problem solving. Group dynamics research on development began in the late 1940s, with a focus on the psychosocial and emotional aspects of group life. Working primarily with therapy groups, T-groups, and self-study groups, researchers originally saw a group's task in terms of the achievement of personal and interpersonal goals like insight, learning, or honest communication (Mills, 1979). They explored development as the progress, over a group's life-span, of members' ability to handle issues seen as critical to their ability to work, such as dependency, control, and intimacy (Bennis & Shepard, 1956; Bion, 1961; Mann, Gibbard, & Hartman, 1967; Slater, 1966).

In 1965, Tuckman synthesized this literature in a model of group development as a unitary sequence that is frequently cited today. The sequence, theoretically the same for every group, consists of forming, storming, norming, and performing. Tuckman and Jensen's 1977 update of the literature on groups left this model in place, except for the addition of a final stage, adjourning. Models offered subsequently have also kept the same pattern. Proposed sequences include: define the situation, develop new skills, develop appropriate roles, carry out the work (Hare, 1976); orientation, dissatisfaction, resolution, production, termination (LaCoursiere, 1980); and generate plans, ideas, and goals; choose/agree on alternatives, goals, and policies; resolve conflicts and develop norms; perform action tasks and maintain cohesion (McGrath, 1984).

The second stream of research on group development concerns phases in group problem solving, or decision development. Researchers have typically worked with groups with short life-spans, usually minutes or hours, and studied them in a laboratory as they performed a limited task of solving a specific problem. Studies have focused on discovering the sequences of activities through which groups empirically reach solutions—or should reach solutions—and have used various systems of categories to analyze results. By abstracting the rhetorical form of group members' talk from its content and recording percentages of statements made in categories like "agree" and "gives orientation," researchers have portrayed the structure of group discussion. The classic study in this tradition is Bales and Strodtbeck's (1951) unitary sequence model of three phases in groups' movement toward goals: orientation, evaluation, and control.

Though they differ somewhat in the particulars, models from both streams of research have important similarities. Indeed, Poole asserted that "for thirty years, researchers on group development have been conducting the same study with minor alterations" (1983b: 341). The resultant models are deeply grounded in the paradigm of group development as an inevitable progression: a group cannot get to stage four without first going through stages one, two, and three. For this reason, researchers construe development as movement in a forward direction and expect every group to follow the same historical path. In this paradigm, an environment may constrain systems' ability to develop, but it cannot alter the developmental stages or their sequence.

Some theorists have criticized the validity of such models. Research by Fisher (1970) and by Scheidel and Crowell (1964) suggested that group discussion proceeds in iterative cycles, not in linear order. Bell (1982) and Seeger (1983) questioned Bales and Strodtbeck's methodology. Poole (1981, 1983a, 1983b) raised the most serious challenge to the problem-solving models by demonstrating that there are many possible sequences through which decisions can develop in groups, not just one.[1] Despite these critiques, however, the classic research continues to be widely cited, and the traditional models continue to be widely presented in management texts as the facts of group development (Hellriegel, Slocum, & Woodman, 1986; Szilagy & Wallace, 1987; Tosi, Rizzo, & Carroll, 1986).

Apart from the question of validity, there are gaps in all the extant models, including those of the critics, that seriously limit their contribution to broader research and theory about groups and group effectiveness. First, as Tuckman pointed out in 1965 and others have noted up to the present (Hare, 1976; McGrath, 1986; Poole, 1983b), they offer snapshots of groups at different points in their life-spans but say little about the mechanisms of change, what triggers it, or how long a group will remain in any one stage. Second, existing models have treated groups as closed systems (Goodstein & Dovico, 1979). Without guidance on the interplay between groups' development and environmental contingencies, the models are particularly limited in their utility for task groups in organizations. Not only do organizational task groups' assignments, resources, and requirements for success usually emanate from outside the groups (Gladstein, 1984; Hackman, 1985), such groups' communications with their environments are often pivotal to their effectiveness (Katz, 1982; Katz & Tushman, 1979).

THE APPROACH OF THIS STUDY

The ideas presented here originated during a field study of how task forces—naturally-occurring teams brought together specifically to do projects in a limited time period—actually get work done. The question that drove the research was, what does a group in an organization do, from the moment it convenes to the end of its life-span, to create the specific product that exists at the conclusion of its last meeting? I was therefore interested not just in interpersonal issues or problem-solving activities, the foci of past research, but in groups' attention to outside resources and requirements, their temporal pacing, and in short, in whatever groups did to make their products come out specifically the way they did, when they did. Since the traditional models do not attend to these issues, I chose an inductive, qualitative approach to increase the chances of discovering the unanticipated and to permit analysis of change and development in the specific content of each team's work.

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[1] This work was called to my attention by a reviewer.

This study was designed to generate new theory, not to test existing theory, and the paper is organized to present a new model, not to refute an old one. For clarity, however, differences between the proposed and traditional models of group development are noted after each segment of the Results section.

METHODS

Because this study was somewhat unconventional, it may help to start with an overview. I observed four groups (A, B, C, and D in Table 1) between winter 1980 and spring 1981, attending every meeting of every group and generating complete transcripts for each. This observation was done as part of a larger study of group effectiveness (Gersick, 1982; Hackman, forthcoming). I also prepared a detailed group-project history for presentation to each team.

After I had completed studies of the four groups it was evident that their lives had not gone the way the traditional models predicted. Not only did no single developmental model fit all the teams, the paradigm of group development as a universal string of stages did not fit the four teams taken together. The sequences of activities that teams went through differed radically across groups. Moreover, activities and issues that most theories described as sequential progressions were in some cases fully simultaneous or reversed.

Those findings prompted me to reexamine the groups' transcripts. I began formulating a tentative new model of group development through the method of grounded theory (Glaser & Strauss, 1967), identifying similarities and differences across the histories and checking emerging hypotheses against original raw data. The results were rewarding, but since three of the four groups were from the same setting, it seemed important to continue to expand the data base. I sought groups that fit into the research domain but that varied as much as possible in project content and organizational setting. As Harris and Sutton pointed out, "Similarities observed across a diverse sample offer firmer grounding for . . . propositions [about the constant elements of a model] than constant elements observed in a homogeneous sample" (1986: 8). Four additional groups (E, F, G, and H in Table 1) were studied in 1982–83. In line with Glaser and Strauss's suggestion, I stopped after observing the second set of groups because all the results were highly consistent.

The Research Domain

Several features distinguish the groups included in the domain of this research. They were real groups—members had interdependent relations with one another and developed differentiated roles over time, and the groups were perceived as such both by members and nonmembers (Alderfer, 1977). Each group was convened specifically to develop a concrete piece of work; the groups' lives began and ended with the initiation and completion of special projects. Members had collective responsibility for the work. They were not merely working side by side or carrying out preset orders; they had to make interdependent decisions about what to create and how to proceed. The groups all worked within ongoing organizations, had external managers or supervisors, and produced their products for outsiders' use or evaluation. Finally, every group had to complete its work by a deadline.

Data Sources

The eight groups in the study (see Table 1) came from six different organizations in the Northeast; the three student groups came from the same university. Their life-spans varied in duration from seven days to six months. I did not select groups randomly but did choose them carefully to ensure that they fit within the research domain and that all meetings could be observed from the start to the finish of their projects. The management students were recruited from graduate courses that required group projects. After describing the study to each class, I asked the groups to volunteer. I gained entry to the other five groups through referrals to individual members. Team members were provided with information about the study and with opportunities

TABLE 1
The Groups Observed

Teams[a]	Task	Time-span	Number of Meetings
A. Graduate management students: 3 men	Analyze a live management case.	11 days	8
B. Graduate management students: 2 men, 3 women	Analyze a live management case	15 days	7
C. Graduate management students: 3 men, 1 woman	Analyze a live management case.	7 days	7
D. Community fundraising agency committee: 4 men, 2 women	Design a procedure to evaluate recipient agencies.	3 months	4
E. Bank task force: 4 men	Design a new bank account.	34 days	4
F. Hospital administrators: 3 men, 2 women	Plan a one-day management retreat.	12 weeks	10
G. Psychiatrists and social workers: 8 men, 4 women[b]	Reorganize two units of a treatment facility.	9 weeks[c]	7
H. University faculty members and administrators: 6 men	Design a new academic institute for computer sciences.	6 months[c]	25

[a] The three student groups were from one large, private university. Team H was from a small university.

[b] Two other members attended only once; one other member attended two meetings.

[c] The actual time-span (shown) differed from the initially expected span (see Table 2).

to ask questions; no team was included without all its members' permission. All teams except team D permitted audio taping.

Data Collection

Every meeting of every team was observed, and handwritten transcripts were made during each meeting to back up the audio tapes. In addition to records of members' verbal communication, the handwritten notes included group-level indicators of the energy members applied to their work (attendance, scheduling, and duration of meetings), the use of physical devices to structure work (writing on blackboards and taking notes), and routines (meeting times, locations, and seating patterns). For the second four groups, I also interviewed members after their projects were over to address aspects of each project's development that I did not directly observe: the project's history, events that happened outside meetings, and members' expectations, perceptions, and evaluations of the project.

Data Analysis

This study follows the tradition of group dynamics research in its qualitative analytical approach. I developed a case history for each of the first four groups after its product was completed, the unit of analysis being the group meeting. I did not reduce teams' activities to a priori categories for three reasons. (1) Existing category systems have measured the frequency of groups' activities without necessarily indicating their meaning; a large percentage of problem-orientation statements, for example, could mean either that a group did a careful job or that it had great difficulty defining its task. (2) A priori categories would have been unable to capture qualitative, substantive revisions in groups' product designs. (3) Category systems may be used for specific hypothesis testing but are inappropriate for inductive discourse analysis in theory development (Labov & Fanshel, 1977: 57).

Instead of using a priori categories, I read transcripts repeatedly and used marginal notes to produce literal descriptions of what was said and done at each meeting that were much like detailed minutes. These descriptions encompassed modes of talk, like production work, arguing, and joking; topics covered; teams' performance strategies, that is, implicit or explicit methods of attacking the work; any immediate or long-term planning they did; patterns of relations among members, such as roles, coalitions, and conflicts; and teams' discussions about or with outside stakeholders and authorities.

The entire course of meetings was searched to pinpoint milestones in the design of the products. This process was similar to that usually followed implicitly when a scholar develops a history of the body of work of an artist, writer, or scientist. I identified ideas and decisions that gave the product its basic shape or that would be the fundamental choices in a decision tree if the finished product were to be diagrammed. I also identified points at which milestone ideas were first proposed, whether or not they were accepted at that time. The expression of agreement to adopt a proposal and evidence that the proposal had been adopted were the characteristics of milestone decisions.

When a proposal was adopted, either subsequent discussion was premised on it or concrete action followed from it. The milestones added precision to the qualitative historical portrait of each team's product. I searched the complete string of each team's meetings to identify substantive themes of discussion and patterns of group behavior that persisted across meetings and to see when those themes and patterns ceased or changed.

After the first four histories were complete, I searched them for general patterns by isolating the main points from each team's case, forming hypotheses based on the similarities and differences across groups, and then returning to the data to assess and revise the hypotheses. Analysis of data from the first four groups suggested a new model of group development, which I explored and refined in the second stage of the study.

Analysis of the second set of groups again began with the construction of a detailed project history for each team, but construction of the second set of histories was more systematic. To help preserve the literal completeness of project histories and to forestall premature closure on the developmental model, I condensed each team's transcripts in three successive steps. Every turn members took to speak was numbered and the content condensed to retain the literal meaning in a streamlined form; for example, "628: Rick role-plays president's reaction to the idea of tiering the account." I then condensed these documents by abstracting members' exchanges, a few statements at a time, into a detailed topic-by-topic record of the meeting; for example, "646–656: strategizing how to get soundings from outsiders on whether or not to tier the account." The third condensation produced a concise list of the events—the discussions, decisions, arguments, and questions—of each meeting. The following is a sample item: "Team estimates outsiders' reactions to tiering account. Decides to test the waters before launching full design effort; plans how to probe without losing control over product design." The condensation process reduced transcripts of 50 or more pages to 1-page lists, concise enough to allow an overall view of teams' progress across all meetings, yet documented minutely enough to trace general observations back to the numbered transcripts for concrete substantiation or refutation.

After the second four teams' histories were complete, I used them for another iteration of theory-building work. Transcripts of meetings and interviews were searched to see whether or not features common to the first four groups appeared. Again, similarities and differences among all eight groups were used to extend and refine the model.

Presentation of Results

Qualitative research permits wide exploration but forgoes the great economy and precision with which quantified results can be summarized and tested. This study employed description and excerpts from meetings and interviews to document, in members' words as often as possible, what happened in the teams and how they progressed over time.

RESULTS

An Overview of the Model

The data revealed that teams used widely diverse behaviors to do their work; however, the *timing* of when groups formed, maintained, and changed the way they worked was highly congruent. If the groups had fit the traditional models, not only would they have gone through the same sequence of activities, they would also have begun with an open-ended exploration period. Instead, every group exhibited a distinctive approach to its task as soon as it commenced and stayed with that approach through a period of inertia[2] that lasted for half its allotted time. Every group then underwent a major transition. In a concentrated burst of changes, groups dropped old patterns, reengaged with outside supervisors, adopted new perspectives on their work, and made dramatic progress. The events that occurred during those transitions, especially groups' interactions with their environments, shaped a new approach to its task for each group. Those approaches carried groups through a second major phase of inertial activity, in which they executed plans created at their transitions. An especially interesting discovery was that each group experienced its transition at the same point in its calendar—precisely halfway between its first meeting and its official deadline—despite wide variation in the amounts of time the eight teams were allotted for their projects.

This pattern of findings did not simply suggest a different stage theory, with new names for the stages. The term "stage" connotes hierarchical progress from one step to another (Levinson, 1986), and the search for stages is an effort to "validly distinguish . . . types of behavior" (Poole, 1981: 6–7), each of which is indicative of a different stage. "Stage X" includes the same behavior in every group. This study's findings identified temporal periods, which I termed phases, that emerged as bounded eras within each group, without being composed of identical activities across groups and without necessarily progressing hierarchically. It was like seeing the game of football as progressing through a structure of quarters (phases) with a major half-time break versus seeing the game as progressing in a characteristic sequence of distinguishable styles of play (stages). A different paradigm of development appeared to be needed.

The paradigm through which I came to interpret the findings resembles a relatively new concept from the field of natural history that has not heretofore been applied to groups: *punctuated equilibrium* (Eldredge & Gould, 1972). In this paradigm, systems progress through an alternation of stasis and sudden appearance—long periods of inertia, punctuated by concentrated, revolutionary periods of quantum change. Systems' histories are expected to vary because situational contingencies are expected to influence significantly the path a system takes at its inception and during periods of revolutionary change, when systems' directions are formed and reformed.

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[2] This paper uses the dictionary definition of inertia as the tendency of a body to remain in a condition: if standing still, to remain so; if moving, to keep moving on the same course.

In sum, the proposed model described groups' development as a punctuated equilibrium. *Phase 1*, the first half of groups' calendar time, is an initial period of inertial movement whose direction is set by the end of the group's first meeting. At the midpoint of their allotted calendar time, groups undergo a *transition*, which sets a revised direction for *phase 2*, a second period of inertial movement. Within this phase 1-transition-phase 2 pattern, two additional points are of special interest: the first meeting, because it displays the patterns of phase 1; and the last meeting, or completion, because it is a period when groups markedly accelerate and finish off work generated during phase 2.

Special Aspects of the Model

The importance of the first meeting was its power to display the behaviors (process) and themes (content) that dominated the first half of each group's life. Each group appears to have formed almost immediately a framework of givens about its situation and how it would behave. This framework in effect constituted a stable platform from which the group operated throughout phase 1.

Members occasionally clearly indicated their approach to something, stating their premises and how they planned to behave ("The key issue here is X; let's work on it by doing Y"); however, teams seldom formulated their frameworks through explicit deliberation. Instead, frameworks were established implicitly, by what was said and done repeatedly in the group. That phenomenon was observable on several fronts. The themes, topics, and premises of discussions provided evidence; for example, a group might take as given that its organization's staff is not talented and discuss every project idea in terms of how hard it would be to explain to the sales force. Members' interaction patterns—the roles, alliances, and battles members took on—also revealed implicit frameworks. Performance strategies, or methods of attacking the work, were another indicator. A group's behavior toward its external contexts—for example, acting dependent or acting assertive about outside stakeholders—provided evidence as well. Finally a group's overall standing on its task—whether it was confident of a plan and working on it, deadlocked in disagreement over goals, or explicitly opposed to the assignment and unwilling to begin work[3]—helped to establish its implicit framework.

Central approaches and behavior patterns that appeared during first meetings and persisted during phase 1 disappeared at the halfway point as groups explicitly dropped old approaches and searched for new ones. They revised their frameworks. The clearest sign of transition was the major jump in progress that each group made on its project at the temporal midpoint of its calendar. Further comparisons, across meetings within groups and across groups, revealed five empirical earmarks of the transition, a set of events uniquely characteristic of midpoint meetings. The frameworks that groups formed at transition carried them through a second period of momentum, phase 2, to a final burst of completion activities at their last meetings.

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[3] Three dimensions of a group's stance on a task emerged from the data. Members may accept or object to an assignment, may be certain or uncertain what to do about a task, and may converge or diverge with each other about these issues. The dimensions may be arrayed in a $2 \times 2 \times 2$ matrix to suggest a number of potential answers to the question "Where do we stand?". The three dimensions are primarily concerned with members' approaches toward context, task, and internal interaction, yet they are closely intertwined.

ILLUSTRATION OF THE MODEL

Three groups will serve as examples to illustrate each part of the model. Each is representative of the overall model, yet each shows some aspects especially concisely, and the differences between the groups show the diversity within the pattern.

First Meeting and Phase 1

Almost immediately, in every team studied, members displayed the framework through which they approached their projects for the first half of their calendar time. Excerpts show the scope, variety, and nature of those frameworks.

Excerpt 1 (E1). A team of three graduate management students start their first, five-minute encounter to plan work on a group case assignment, defined by the professor as an organizational design problem.[4]

1. Jack: We should try to read the [assigned] material.
2. Rajeev: But this isn't an organizational design problem, it's a strategic planning problem.
3. (Jack and Bert agree.)
4. Rajeev: I think what we have to do is prepare a way of growth [for the client].
5. (Nods, "yes" from Jack and Bert.)

Excerpt 1, representing less than one minute from the very start of a team's life, gives a clear view of the opening framework. The team's approach toward its organizational context (the professor and his requirements) is plain. The members are not going to read the material; they disagree with the professor's definition of the task and will define their project to suit themselves.

Their pattern of internal interaction is equally visible. When Rajeev made three consequential proposals—about the definition of the task, the team's lack of obligations to the professor, and the goal they should aim for—everyone concurred. There was no initial "storming" (Tuckman, 1965; Tuckman & Jensen, 1977) in this group. The clip also shows this team's starting approach toward its task: confidence about what the problem is, what the goal ought to be, and how to get to work on it. The team's stated performance strategy was to use strategic planning techniques to "prepare a way of growth."

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[4] All names used in this report are pseudonyms.

Excerpt 2 (E2). The following excerpt of the team's next work session, two days later, shows how well the minute of dialogue from the first meeting indicated lasting patterns.

> 1. Jack: I have not looked at any of the readings—did you look at all?
>
> 2. (Bert and Rajeev laugh.)
>
> 3. Jack: . . . I was thinking . . . we could do alternatives—different ways to grow . . . like a prospectus for a consulting study.
>
> 4. Bert: That's exactly the way I'd go. (Restates Jack's position.)
>
> 5. Rajeev: Well . . . we are thinking mostly in the same manner. My idea was . . . . (He states the same plan.)
>
> (After five minutes of discussion about the client and his situation, Rajeev suggests they start work.)
>
> 6. Jack: We've got some more time . . . I think it would be premature to describe alternative goals yet . . . .
>
> 7. Rajeev: If we can generate some of the assumptions now and talk about the alternatives later—it's a two-step thing.
>
> 8. Jack: OK, that's fine. Let's start that.
>
> 9. Rajeev: (at blackboard) What are the things on which the business depends?

The dialogue shows that the team is still disregarding the professor (E2, 1 & 2),[5] still working in easy agreement (E2, 4, 5, & 8), and still taking the same approach to the task (E2, 3). It also shows the group *acting* on its expressed intentions, employing a logical, orderly technique to construct its product (E2, 6–9). The team worked within this framework for two full meetings. Rajeev led the group through a structured set of strategic planning questions. At that point, the team had a complete draft outline of a growth plan for its client.

Excerpt 3 (E3). A group of four bank executives open their first meeting to design a new type of account.

> 1. Don: What do you think we ought to do to start this, Rick? Just go through each of these? (Referring to a written list of topics.)
>
> 2. Rick: Well, I want to explain to Gil and Porter—we had a little rump session the other day just to say "What the hell *is* this thing? What does it *say*, and what are the things that we have to decide?" And what we did was run through a group of 'em . . . . These are not necessarily in order of importance—they're in order of the way we thought of 'em, really . . . .

This excerpt of the first 25 seconds in the life of another task force, showing a quite different beginning, also illustrates the team's approach toward its task, and its performance strategy. This team did not choose a product through the whole first half of its life. Given a new set of federal rules, the team's reaction was to ask the questions "What the hell *is* this thing? What does it say?" The team was uncertain, and as the project began they approached the task as a job of mapping out "the things we have to decide."

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[5] The notation "E2, 1" identifies the excerpt (E2) and the line or lines (1) of dialogue.

The excerpt is also an elegant summary of the group's performance strategies. It shows that the leader prepared for the meeting with one other member, that the preparation consisted of generating a list of topics to be covered, and that this list was arranged only "in order of the way we thought of 'em." This general strategy was followed for every one of the group's meetings. Before each meeting, a pair of members prepared skeletal documents for the group to work from. Items were checked off the documents as they were covered, but discussions were more like pinball games than orderly progressions. Each question ricocheted the conversational ball onto several new questions, and occasionally bells and lights went off as the team made a decision about a specific point.

The link between the team's pinball-style performance strategies and its approach to its task as "mapping" was strong. As one member, trying to keep track of the discussion, said to another, "It's all intertwined."

For the first two of its four meetings, the dominant activity of this team's members was to generate the questions that needed to be settled in a loosely structured format and to go as far as they could in answering each. Their own definition of where they were, from inception through the end of this period, was that they did not yet know "what we're planning to offer. We're still thinking."

Excerpt 4 (E4). Five hospital department heads are a few minutes into their first meeting to plan the fourth in a series of management retreats for their peers and division chief. They have just chosen a date and place.

> 1. Nancy: So, in order of preference, the [dates we want are] the tenth, third, and ninth.
>
> 2. Sandra: Sounds great. . . . (to Bernard): I think you probably should talk to the division chief about—did he give you any thoughts about what we should do next?
>
> 3. Bernard: I'd say—that's on us . . . .
>
> 4. Sandra: Um hum. The only thing I feel strongly about is—it's not time to have an outside [facilitator].
>
> 5. Bill: Well, I'm not for or against [that] but—what are we trying to achieve? Trust among—people? . . . the highest value [on the participants' critique of the previous retreat was] developing trust among the managers themselves . . . and not only trust among ourselves . . . . I think there has to be trust—upward.
>
> 6. Sandra: And *that's* the issue we talk about, and walk around the edges of . . . . We say, "Yeah, Tom [division chief], we trust you," but we don't trust you very *well*, 'cause we don't dare say we don't trust *you*, Tom.
>
> 7. Bill: Yep. The sacred cow, like you said earlier.
>
> 8. Bernard: There's three levels, aren't there? The people we supervise, peers that we work with, as well as . . . .

The hospital administrators team began at an impasse. After they had swiftly decided where and when to hold the retreat, the pace plummeted with the question of what to do with the event. The team's opening framework shows the problem. The members' position toward their organizational context was complicated because the final product had to please the task delegator, the division chief, but he had given no indication of what they "should do next," and the team leader was unwilling to ask (E4, 2–4). The team's approach to its task was closely related to that ambivalence. Members' opening premises were that the retreat ought to deal with trust, especially with regard to the division chief, and that they should run it themselves without bringing in an outside facilitator (E4, 4–6). Those premises put the team in a self-imposed bind as evidence by the statement " 'cause we don't dare say we can't trust *you*, Tom." The team's key phase 1 question was "What are we trying to achieve?" (E4, 5).

The concern with intradivisional relationships and the feelings of directionlessness in the group continued for the first six weeks of the team's 12-week life-span. In a later interview, a member said, "From [the beginning] to the [end of October] all I can remember is talking. With absolutely *no* idea of what was going to happen. None." This was so even though members were concerned and *wanted* meetings to be different. Another member said, "It was very frustrating from September 20 until maybe November 1 for me [the first through the sixth weeks]. That's a long time to be frustrated." A third member noted, "It was very difficult to get the work going. We had no direction, only to put together a retreat . . . . Nothing was happening! I was very frustrated." The group made no decisions about what to do at the retreat during its first phase.

Table 2 summarizes the findings about first meetings and phase 1. Column 1 presents each team's starting approach toward its task, and column 2 summarizes the central task activity of phase 1, including the first meeting.

Each group immediately established an integrated framework of performance strategies, interaction patterns, and approaches toward its task and outside context. The most concise illustration of this finding comes from the student group, whose (1) easy agreement on (2) a specific plan for its work represented (3) a decision to ignore the outside requirements for its task—all within the same minute of group discussion. Such frameworks embodied the central themes that dominated all through the first half of groups' calendar time, even for teams that were frustrated with the paths they were following. This finding contradicts traditional models, which pose teams' beginnings as a discrete stage of indeterminate duration during which teams orient themselves to their situation, explicitly debating and choosing what do do.

Though each team began with the formation of a framework, each framework was unique as illustrated by the contrast between the students' instant confidence and the hospital administrators' directionlessness. Some teams began with harmonious internal interaction patterns; others, with internal storms. Teams took very different approaches to authority figures from their outside contexts, as evidenced by the hospital administrator's preoccupation with the division chief versus the students' cheerful disregard for the professor. These findings contradict the typical stage theory paradigm in

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TABLE 2
An Overview of the Groups' Life Cycles

Teams	First Meeting	Phase 1	Transition	Phase 2	Completion
A. Student team A	Agreement on a plan.	Details of plan worked out: client's "growth options."	First draft revised; second draft planned.	Details of second plan worked out: organization design.	Homework compiled into paper, finished, and edited.
B. Student team B	Disagreement on task definition.	Argument over how to define task: challenge vs. follow client's problem statement.	Task defined; case analysis rough-outlined.	Details of outline worked out: affirmative action plan, following client's request.	Paper (drafted by one member) finished; edited.
C. Student team C	One member proposes concrete plan; others oppose it.	Argument over details of competing plans ("structured" vs. "minimal") but no discussion of goals.	Goals chosen; case analysis outlined.	Details of outline worked out: "minimalist" U.S. trade policy.	Homework compiled into paper, finished, and edited.
D. Community fundraising agency committee	Agreement on a plan.	Details of plan worked out: "nonthreatening" self-evaluation for member agencies.	First draft revised; second draft planned.	Details of second plan worked out: explicitly allocations-related evaluation plan.	Report (drafted by two members) edited.
E. Bank task force	Uncertainty about new product; federal regulations unclear.	Team "answers questions"; maps possible account features.	Account completely outlined.	Members work throughout bank on systems, supplies for account.	Account finalized for advertising; bank-wide training planned.
F. Hospital administrators	Team fixes on "trust" theme; uncertain what to do with it for program.	Unstructured trial and rejection of program possibilities; disagreement about goals.	Complete program outlined.	Consultant hired to plan program; team arranges housekeeping details.	Responsibility for final preparations delegated.
G. Psychiatrists and social workers	Leader presents "the givens"; team opposes project.	Subgroup reports presented; members object to all plans; leader rebuts objections.	Disagreement persists; leader picks one plan; redelegates task; dissolves team.		
H. University faculty members and administrators	Team divided on whether to accept project; leader proposes diagnosis as first step.	Structured exploration; diagnosis of situation.	Team redefines task; commits to project.	Computer institute designed (original task) plus system for university computer facilities planning.	Report (written by leader from members' drafts) edited and approved.

which it is assumed that all teams essentially begin with the same approach toward their task (e.g., orientation), their team (e.g., forming then storming), and toward authority (e.g., dependency).[6]

The Midpoint Transition

As each group approached the midpoint between the time it started work and its deadline, it underwent great change. The following excerpts from transitional meetings illustrate the nature and depth of this change. Particular points to notice are members' comments about the time and their behavior toward external supervisors.

Excerpt 5 (E5). The students begin their meeting on the sixth day of an 11-day span.

> 1. Rajeev: I think, what he said today in class—I have, already, lots of criticism on our outline. What we've done now is OK, but we need a lot more emphasis on organization design than what we—I've been doing up to now.
>
> 2. Jack: I think you're right. We've already been talking about [X]. We should be talking more about [Y].
>
> 3. Rajeev: We've done it—and it's super—but we need to do other things, too.
>
> 4. (Bert agrees.)
>
> 5. Jack: After hearing today's discussion—we need to say [X] more directly. And we want to say more explicitly that . . . .
>
> 6. Rajeev: . . . should we be . . . organized and look at the outline? . . . We should know where we're going.
>
> (The group goes quickly through the outline members had prepared for the meeting, noting changes and additions they want to make.)
>
> 7. Rajeev: The problem is, we're very short on time.

The students came to this meeting having just finished the outline of the strategic plan they had set out to do at their opening encounter (see E1). At their midpoint, they stopped barreling along on their first task. They marked the completion of that work, evaluated it, and generated a fresh, significantly revised agenda. The team's change in outlook on its task coincided with a change in stance toward the professor. Revisions were made that were based on "what he said today in class" and " hearing today's discussion." Having reaffirmed the value of their first approach to the case, members reversed their original conviction that it was "not an organizational design problem." This was the first time members allowed their work to be influenced by the professor, and at this point, they accepted his influence enthusiastically.

It is significant that Rajeev's remark, "we're very short on time," was only the second comment about the adequacy of the time the group had for the project, and it marked a switch from Jack's early sentiment that "we've got some more time" (E2, 6). A new sense of urgency marked this meeting.

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[6] The authority designation comes from Mann, Gibbard, and Hartman (1967).

The students knew what they wanted to create at their first meeting; the bank team members started much closer to scratch and they were not nearly as far along as the students at the midpoint. Their transitional meeting was different from the students' in character but similar in scope and magnitude.

Since the bankers scheduled each meeting ad hoc, it is noteworthy that the third one fell on the 17th day of a 34-day span. As he convened the group, Don worried that if they continued their present course, they might not finish on time: "We can explore all the ramifications [of the regulations], but I just hope we don't get *stuck*, toward the end, without . . . ." In the first minutes of this meeting, members confirmed their intentions to move to the next step: "Basically, we're gonna lay out the characteristics of the account." The next two hours were spent problem solving with two staff experts who had been invited to the meeting to make sure the account design would fit the bank's computer systems. By the end of that time, the basic design was finished.

The leap forward on the task coincided with a change in the team's relationship with its organizational context. At first, the group decided its meetings would be closed to staff people "[until] . . . we know how we want to handle this . . . ." The third meeting marked that shift. Moreover, one of the members had a key meeting with the bank chairman that afternoon, to argue for the extra resources he now felt were needed to market the team's product successfully.

If the bank team started out less far along in its work than the students, the hospital team was even a step behind the bankers. Though everyone said that intradivision relationships were the key topic to address, the team could not agree on a goal for the retreat and spent the first half of its life describing and rejecting a series of ideas. Statements 1–3 of the following excerpt show how little concrete progress the team had made halfway through its calendar; the remaining lines show how much they then accomplished at the meeting.

Excerpt 6 (E6). The hospital administrators hold their fifth meeting, in the sixth week of a 12-week span.

> 1. Bernard (to Bill, just before the meeting): I'm gonna bring Tom [the division chief] to the next meeting, Bill. . . . Last time we were struggling like we are here—Tom [really helped] to sort things out . . . .
>
> 2. Bernard (convening meeting): . . . I think we need to . . . brainstorm about [the program]—see what we might come up with, and bounce it off Tom next time. (He recaps an idea he brought to the previous meeting.)
>
> 3. Sandra: We'd each be responsible for an hour of the program? As facilitators, or role playing—whatever we decided to do?
>
> (Later in the meeting, there was a dramatic shift in the discussion when Nancy described a management simulation program on the problems of middle managers, run by a consultant who worked nearby.)
>
> 4. Sandra: If awareness is all that comes out of the day . . . I think that's a good—a reasonable goal.

> 5. Nancy: Understanding, too, some of the forces that operate on us as middle managers—that's where we are, in our relationship with the top manager . . . .
>
> 6. Bernard: Yeah . . . that's the thing that we all share together, with the exception of Tom—is that we're in the middle, and it's a difficult spot to be in. And this would show that . . . .
>
> 7. Sandra: (adds up the time that the simulation and debriefing would take) So—there's the rest of the day! . . . I think that's reasonable to run by Tom.
>
> (The team endorsed the program and decided to invite the consultant Nancy mentioned to run it. The following are from the close of the meeting.)
>
> 8. Bill: We are making progress! I was afraid we weren't moving fast enough!
>
> 9. Sandra: I had the same problem! . . . I felt . . . in the beginning, there was a lot of talk . . . . That's necessary in some degree—then, I think, you gotta *move* on it.
>
> 10. Bernard: We've made progress, folks . . . . [Next week] Tom'll be here, we'll throw those ideas out to him—Monday, we're going to look at the [conference center]—so we've made progress.

This team's midpoint anxiety about finishing on time showed in the meeting and in interviews: "I was uncomfortable that time was going to run out and we were not going to have it done." "I called Nancy and said 'Look—this needs to start going, or we're going to get to [the program date] wondering what we're going to do!' " Yet in a single session, the team managed to solve all the major problems it had struggled with for six weeks. The theme of the new program design, "being in the middle," was actually not new to the group. It had come up in the very first meeting (see E4, 7) and had been discussed with some enthusiasm at the fourth meeting. But members had been preoccupied trying to make the "trust" idea work. Because "being in the middle" did not fit into the team's original framework, it did not lead to a program design during phase 1.

Two more major changes show in excerpt 6. One was the reversal of the first-meeting approach that members had to run the program themselves (E4, 4) with the decision to get an outside facilitator. Members said in interviews that this change made a tremendous difference. One person captured the whole transition: "The [mood in the team] went *down* . . . and then all of a sudden, it took kind of a swoop . . . 'Ah! It's going to happen!' We decided what we were going to do . . . . The decision to bring in a facilitator was a *great* relief! Then we got the division chief—he said 'OK, go ahead,' and the rest was just mechanics."

The second change occurred in the team's approach toward its task delegator, when Bernard reversed his early decision not to ask the division chief for help (E4, 3; E6, 1). Indeed, the anticipation of talking *to* Tom appeared to spur the team's work at the same time that it marked the end of the talk *about* him.

TABLE 3
Transition Meetings in the Eight Groups

A. Student team A: Day 6 of 11-day span
Team revises first draft of case analysis; plans final draft.
Opening (1) I think, what he said today in class—I have . . . lots of criticism on our outline . . . . We've done it—and it's super—but we need to do other things too.
Closing (2) The problem is, we're very short on time.

B. Student team B: Day 7 of 15-day span
Team progresses from argument over how its task should be defined to rough outline of case analysis.
Opening (1) This is due next Monday, right?
(2) Right. Time to roll.
Later (3) Not bad! We spent one hour on one topic, and an hour on another! . . . We're moving along here, too. I feel a lot better at this meeting than I have—
(4) Well . . . we're also making decisions to be task-oriented, and take the problem at its face value—

C. Student team C: Day 4 of 7-day span
Team progresses from argument over details of competing plans, with no discussion of overall goals, to goal clarification and complete outline of product.
Opening (1) This morning I redesigned the whole presentation! I don't know what the *content* is, but—
Later (2) (Surveying blackboard) OK—we've got goals! Those are the U.S. goals for [X topic]. . . . The [outline for the paper is] the lead-in, the goals, and the strategy.
(3) That makes sense! . . .
(4) I like it!

D. Community fundraising agency committee: Meeting 3 of four preset meetings
Team revises first plan for evaluation procedure; agrees on final plan.
Opening (1) Does anyone have any problem with the . . . evaluation draft?
(2) Let's be realistic—we don't have the staff time to sit down with each [recipient] agency every year.
(3) What are we accomplishing, then? . . . . We need to know [X]. Otherwise I say, "don't bother!"
Later (4) (Summing up a revised version of the plan) If you tell [member agencies] they *will* be evaluated . . . and these are questions you'll be asked, so—get your baloney swinging . . . ! [Laughter from team] OK. Let's move on, otherwise we're going to get behind.

E. Bank task force: Day 17 of 34-day span
Team progresses from "answering questions" to designing complete outline of new bank account.
Opening (1) I just hope we don't get *stuck*, toward the end, without—
(2) What are we gonna do—just—answer a lot of questions today? —or—
(3) . . . basically, we're gonna lay out the characteristics of the account.
Closing (4) Oh, I think that's super!
(5) I think we got a good product!

F. Hospital administrators: Week 6 of 12-week span
Team progresses from uncertainty and disagreement about goal to a complete program plan.
Opening (1) . . . we need to . . . come up with [something to] bounce off Tom next time.
Closing (2) We are making progress! I was afraid we weren't moving fast enough!
(3) We've made *progress*, folks!

TABLE 3 (continued)

G. Psychiatrists and social workers: Week 9 of 17-week span		
Leader chooses one of three reorganization plans to break stalemate; dissolves team.		
Opening	(1)	Is [plan A] a reasonable way to go? *That's* the question.
Closing	(2)	We are nearing the completion of our task . . . the next step is turning [the work] over [to Dr. C.] . . . There *is* disagreement in here, [but] I think . . .we have to come *down* . . . [on one plan] . . . . Then we are—dissolved . . . . Thank you.
H. University faculty members and administrators: Week 7 of 14-week span		
Team redefines task; progresses from skepticism to commitment.		
Opening	(1)	. . . the task force reached a crossroads last meeting . . . and decided it [must choose] whether it should [continue with its original task] or consider the overall needs. For that reason, we've asked two people at the vice-presidential level to . . .help us deliberate that question.
Closing	(2)	I think we've . . . reached a conclusion today, and that is, we need to include the administrative end [in our task].
	(3)	Hey, I think we're finally giving Connie some good stuff here! Isn't this typical? You go through, you roll along, and then all of a sudden you say, "What are we doing?" Then we go back and *reconstitute* ourselves! Anyway, processes are taking place!

The structure of the transition period was similar for all the teams, even though the specific details differed widely. Table 3 shows the timing of each team's transition meeting, describes the changes that occurred in the work at that point, and documents those changes in members' words. Five major indicators, or earmarks, of the transition are reviewed below.[7]

First, teams entered transition meetings at different stages in their work, but for each, progress began with the completion or abandonment of phase 1 agendas. For example, groups A and D entered transition meetings with complete drafts of plans that had been hatched when they started, and team H finished a system diagnosis just before its midpoint (see Table 1). The hospital administrators dropped key premises that the program would be about trust and run by themselves. Team G's leader unexpectedly pronounced the group's task complete at its midpoint (G, 2),[8] but interviews indicated that members, too, felt it was time to move dramatically: "At that point . . . there was a need to go up. But instead of going up, we stopped."

Second, team members expressed urgency about finishing on time. At this time—and no other—members expressed explicit concern about the pace and timeliness of their work: "We ought to be conscious of deadlines" (Team H, transition meeting; see also Table 3: A, 2; B, 1 & 2; D, 4; E, 1; and F, 2). Group G, dissolved with no prior warning (or protest) at its midpoint, was the only team that did not fit this pattern.

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[7] Two additional indicators of transition, a pretransition low point and a change in groups' routines, are not covered here because of space limitations. A discussion of all seven indicators is available in Gersick (1984).

[8] In the discussion of indicators, letters identify teams, and numbers identify lines of dialogue in Table 3.

Third, teams' transitions all occurred at the midpoints of their official calendars, regardless of the number or length of meetings teams had before or after that.

Fourth, new contact between teams and their organizational contexts played important roles in their transitions. Most often, this contact was between the team and its task delegator. Sometimes it was initiated by the team (E and F), sometimes by both at once (A, D, and H),[9] and sometimes by the task delegators (B and C).

These contacts both fostered decision making and influenced decision outcomes. Five groups showed explicit new interest in the match between their product and outside resources and requirements. Excerpts A and D and the bank's work with computer experts show how groups shaped their products specifically to contextual resources and requirements. The bank group also illustrates the other side of the coin—a team member took his new assessment of the project out to the organization to request more resources. The importance of this contact is highlighted by the exception, team G, whose lack of information about outside requirements exacerbated its inability to choose. A member stated during its pretransition meeting: "*If* we are expected [to do X] then there is no [way to support plan A over plan B, but] . . . that may not be the demand. Obviously, there's a lot of politics outside this room that are going to define what [we] have to do."

Finally, transitions yielded specific new agreements on the ultimate directions teams' work should take. Regardless of how much or how little members argued during phase 1, every team that completed its task agreed at transition on plans that formed the basis for the completion of the work. In teams with easy phase 1 interaction, the agreeableness itself was not a change. But for teams where phase 1 had been conflictful, transition meetings were high points in collaboration. Indeed, in the one team whose members still disagreed at this point, the leader dissolved the group, chose a plan unilaterally, and moved the work forward by shifting it into other hands (G, 2).

Overall, the changes in teams' work tended to be dialectical. Teams that had started fast, with quick decisions and unhesitating construction of their products, paused at their transitions to evaluate finished work and address shortcomings (A and D). For teams that started slowly, unsure or disagreeing about what to do, transitions were exhilarating periods of structuring, making choices, and pulling together (B, C, E, F, and H). In either case, transitional advances depended on the combination of phase 1 learning and fresh ideas. For example, the bankers' transitional raw materials were ideas generated during phase 1, refined and integrated with the help of expertise newly infused into the team. The hospital administrators, newly open to an alternative format, found use for a theme they had discussed but not developed earlier.

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[9] For example, team H decided to schedule a special meeting to confront top administrators about its mission. Just after that, the leader received two independent requests from administrators to change the team's direction.

Traditional models of group development do not predict a midpoint transition. They present groups as progressing forward if and whenever they accumulate enough work on specific developmental issues—not at a predictable moment, catalyzed by team members' awareness of time limits. Traditional group development models are silent about team-context relations and the influence of such relations on teams' progress. The findings reported here suggest that there is a predictable time in groups' life cycles when members are particularly influenceable by, and interested in, communication with outsiders. Cases in which task delegators contacted teams at this point suggest this interest might be mutual.

Phase 2

Teams' lives were different after the midpoint transition. In all seven surviving teams, members' approaches toward their tasks clearly changed and advanced (Table 2). All seven executed their transitional plans during this period. Posttransitional changes in teams' internal interaction patterns and approaches toward their outside contexts were not so simple. Transitions did not advance every team in these areas, nor did every team use its transition equally well. Internal troubles that went unaddressed during transition sometimes worsened during phase 2, and teams that were lax in matching their work to outside requirements during the transition showed lasting effects.

The student group, which developed strategic "growth options" for its client in phase 1, spent phase 2 building the organizational design, planned at the transitional meeting, to support those options. As the task approach shifted from strategic planning to organizational design, one element of the team's interaction pattern changed. Jack took over from Rajeev as lead questioner. Other than that, the team continued the easy, orderly agreement of its phase 1 interaction style. The team sustained its new perspective on its context, formed at transition, by maintaining attentiveness to the professor's requirements throughout phase 2.

The bankers spent phase 2 executing the details for the account they had designed at transition; they prepared marketing extras, operational machinery, and documents. With this change in focus, the team deepened its transitional move toward working with the organizational context and also dramatically changed its own interaction pattern. The team did not convene as a group during phase 2 but met individually and in pairs with staff members throughout the bank.

The hospital team's phase 1 uncertainty about the task and discussion of relationships did not recur. A consultant, engaged shortly after the midpoint, took charge of planning the program the team chose at its transition; the team's work for the next four meetings consisted of supplying the consultant with information and arranging menus, invitations, and materials for the retreat.

Though the hospital administrators were like the other teams ir phase 2 to carry out transitional plans in task work, their phase 2 chai interaction patterns and approach toward outside context were mc treme and less benign. Internally, the team fell apart just after the tional meeting. Two members, who had engaged in restrained comp through phase 1 but had supported each other at the transition, had a out. The same weekend, the team leader and one other member engei resentment by making some unilateral decisions outside the group, a interaction in meetings deteriorated. The team's transitional openn ward its context also regressed after the chief appeared at the post-mi meeting.

Excerpt 7 (E7). The following comes from an interview with the h team's leader:

> He says "Do what you want. Spend what you want." Then he came to the damn meeting and was worried about money! Giving me mixed signals! That's when I decided, I'm gonna spend what I want and make my own decisions . . . .

By the time the division chief met with the team, the decision to h facilitator—the largest expense—had already been made. It was "too l be "worried about money," and the team never checked its budget w chief.

Phase 2 was a second period of inertia in teams' lives, shaped fully by the events of their transitions. Teams did not alter their ba proaches toward their tasks within this phase. As one hospital team n stated, "We decided what we were going to do [at the midpoint meeti and the rest was just mechanics."

Since all teams were doing construction work on their projects phase 2, similar to "performing" in Tuckman's (1965) synthesis, it was when teams were more similar both to each other and to the trad model than they were in phase 1. However, progress was not so mu traditional models in other respects, since it was not so linear. Some started performing earlier than others, without previous conflict; othe returned to internal conflict after their transition and during p performance. In every team, transitional work centered explicitly on task problems, not on solving internal interaction problems; it surprising, then, that some teams' internal processes worsened af major need for collaborative decision making was past.

Completion

Completion was the phase of teams' lives in which their activiti the most similar to each others'. Three patterns characterized final me (1) groups' task activity changed from generating new materials to and preparing existing materials for external use; (2) as part of this prep their explicit attention toward outside requirements and expectatio sharply; and (3) groups expressed more positive or negative feelin their work and each other. At this point, the major differences am groups involved not what they were doing but how easily their were d

Not surprisingly, groups that had checked outside requirements early on and groups that had paced themselves well all along had easier, shorter final meetings.

The last distinct change in the student team's life occurred the day before the paper was due. This meeting was considerably longer than any other; the team now had to keep working until the case analysis was finished. Members' work activities changed from generating ideas to editing what they had into the form required by the instructor. A sample from that meeting is "I'm not disagreeing with anything you're saying. But I think you got 'em in the wrong section." Though the long hours and the need to edit each others' work made the meeting more difficult than usual, by the time the team was ready to give its presentation, members were expressing their feelings that the project had gone well. The presentation went smoothly and the team received a good grade.

The bank executives' final group meeting marked the "finish [of] all the deliberations" about the design of the account and a shift into activities to educate the public and the branch banks about it: "It's one thing to . . . say we're gonna offer the thing . . . [but now] we've gotta get something out [to the staff] on how to *handle* it." The team went over the account one last time, to get it "written in blood" for the advertising copy, due that day. Then, with two extra staff people, members planned the final approach. After the meeting, everyone rushed off with his own assignment for the new task of getting the whole bank ready for opening day. In interviews later, team members proudly described a memorandum the president had sent congratulating everyone on the success of the account.

By the hospital group's last meeting, its work was mostly done. At this point, the interpersonal tension that had been building during phase 2 erupted in an angry discussion about the handling of the consultant's fee and how to present it to the division chief. But the subject was dropped when a member declared it had been "talked about long enough." The team delegated final responsibilities for the conference and ended the meeting early. On the day of the retreat, half the team members arrived late and left early; otherwise, relations among them appeared smooth. At day's end, the division chief—who had not yet received the bill—toasted the team: "I think this is the best one yet, and I'm looking forward to number five."

In every team, discussion of outsiders' expectations was prominent at the last meeting. As teams anticipated releasing their work into outside hands, they scrutinized it freshly, through outsiders' eyes: "We'll be judged poorly if we . . ."; "You can't promise [X] and then do [Y]." Since phase 2 actions carried out, but did not alter, plans made at transition, teams that entered phase 2 with a poor match between product and requirements had an especially hard time confronting outside expectations at completion. But even teams that discovered in last-day meetings that they had major gaps to fill framed their remaining work as rearranging or fixing what they already had, as these excerpts indicate: "I think our content . . . is good . . . it's just a matter of reorganizing it . . ." (Team B) and "I think we have all the ideas . . . ."

The main task is how to arrange them" (Team A). Though teams' attention to outside requirements was high at last meetings, completion activities did not undo the basic product revisions established at transition.

DISCUSSION

The traditional paradigm portrays group development as a series of stages or activities through which groups gradually and explicitly get ready to perform, and then perform, their tasks. All groups are expected to follow the same historical path. Proponents of existing models specify neither the mechanisms of change nor the role of a group's environment. In contrast, the paradigm suggested by the current findings indicates that groups develop through the sudden formation, maintenance, and sudden revision of a framework for performance; the developmental process is a punctuated equilibrium. The proposed model highlights the processes through which frameworks are formed and revised and predicts both the timing of progress and when and how in their development groups are likely, or unlikely, to be influenced by their environments. The specific issues and activities that dominate groups' work are left unspecified in the model, since groups' historical paths are expected to vary.

The proposed model works in the following way: A framework of behavioral patterns and assumptions through which a group approaches its project emerges in its first meeting, and the group stays with that framework through the first half of its life. Teams may show little visible progress during this time because members may be unable to perceive a use for the information they are generating until they revise the initial framework. At their calendar midpoints, groups experience transitions—paradigmatic shifts in their approaches to their work—enabling them to capitalize on the gradual learning they have done and make significant advances. The transition is a powerful opportunity for a group to alter the course of its life midstream. But the transition must be used well, for once it is past a team is unlikely to alter its basic plans again. Phase 2, a second period of inertial movement, takes its direction from plans crystallized during the transition. At completion, when a team makes a final effort to satisfy outside expectations, it experiences the positive and negative consequences of past choices.

The components of this model raise an interesting set of theoretical questions. Why do lasting patterns form so early and persist through long periods of inertia? Why do teams' behavior patterns and product designs undergo dramatic change precisely halfway through their project calendars? What is the role of a team's context in its development? This exploratory study did not test or prove any prior hypotheses; nonetheless, it is appropriate to ask whether established theory provides any basis for understanding the observed results, to help formulate hypotheses and questions for future testing.

Early Patterns

Why do lasting patterns form so early and persist through long periods of inertia? The present findings show that lasting patterns can appear as early as the first few seconds of a group's life. This finding was unexpected, but it is not unheard of. Reports from the psychoanalytic literature show the power of the first minutes of a therapeutic interview to predict the central issues of the session (Ginnette, 1986; Pittenger, Hockett, & Danehy, 1960: 22b). Quite recently, Bettenhausen and Murnighan found that "unique norms formed in each [of several bargaining groups], typically during their very first agreements" (1985: 359).

The sheer speed with which recurring patterns appear suggests they are influenced by material established before a group convenes. Such material includes members' expectations about the task, each other, and the context and their repertoires of behavioral routines and performance strategies. The presence of these factors would circumscribe the influence of the interaction process that occurs in the first meeting but not rule it out. Bettenhausen and Murnighan (1985) discussed norm formation in terms of what happens when team members encounter the scripts (Abelson, 1976) each has brought to a group's first meeting. Pittenger, Hockett, and Danehy (1960: 16–24) described the opening of a therapeutic interview as the interaction of "rehearsed" material brought in by the patient with the therapist's opening gambit. This construction of first meetings suggests that peoples' earliest responses to each other set lasting precedents about how a team is going to handle the issues, ideas, questions, and performance strategies that members have brought in.

In phase 1, groups define most of the parameters of their situation quickly and examine them no further, concentrating their work and attention on only a few factors. The contrast between this model and the traditional idea that groups take time to generate, evaluate, and choose alternative views before getting to work parallels Simon's (1976) contrast between bounded and perfect rationality, and it may be understood through his argument that people must make simplifying assumptions in order to take any action at all.

The Halfway Point

Why do teams' behavior patterns and product designs undergo dramatic change exactly halfway through their project calendars? The transition can be understood through a combination of two concepts: problemistic search (March & Simon, 1958) and pacing. The idea of problemistic search simply extends the theory of bounded rationality. Its proponents posit that innovation is the result of search and that people do not initiate search unless they believe they have a problem. New perspectives appear to enter a group at transition because team members find old perspectives are no longer viable and initiate a fresh search for ideas.

The problem that stimulates search and stimulates it at a consistent moment in groups' calendars may be explained with the construct of pacing. Groups must pace their use of a limited resource, time, in order to finish by their deadlines. The midpoint appears to work like an alarm clock, heightening members' awareness that their time is limited, stimulating them to compare where they are with where they need to be and to adjust their progress accordingly: it is "time to roll." Since the groups in this research are charged with creating novel products, perspectives created quickly at the first meeting are likely to be found wanting in some way. For example, it may be perfectly suitable to begin with the approach "we're mapping out the task," but that approach must change at some time if there is to be a product. Even groups that started with a plan they liked learned by working on it to see flaws that were not visible when the plan was just an idea.

This model has some important qualifications. If the midpoint is primarily a moment of alarm, when groups feel "we need to move forward *now*," then the transition is an opportunity for, not a guarantee of, progress. This allows for the possibility that a group, like an individual, might feel strongly that it is time to move ahead, yet be unable to do so. Similarly, to hypothesize that transitions are catalyzed by groups' comparison of their actual progress with their desired progress leaves room for the chance that a group may—correctly or incorrectly—be largely satisfied and proceed with little visible change. These qualifications are consistent with the observation that groups' historical paths vary, and they provoke further research by posing the question, what factors affect the success of groups' transitions?

Why the consistent midpoint timing? Halfway is a natural milestone, since teams have the same amount of time remaining as they have already used, and they can readily calibrate their progress. Adult development research offers analogous findings. At midlife, people shift their focus from how much time has passed to how much time is left (Jaques, 1955). Levinson found a major transition at midlife, characterized by "a heightened awareness of mortality and a desire to use the remaining time more wisely" (1978: 192). Nonetheless, it would be premature to base the entire weight of these findings on the midpoint timing of the transition. Some groups may work on schedules that make times other than the midpoint highly salient. Ultimately, the midpoint itself is not as important as the finding that groups use temporal milestones to pace their work and that the event of reaching those milestones pushes groups into transitions. This study raises, but cannot answer, the question of what sets the alarm to go off when it does and precisely how it works in groups.

Context

What is the role of a team's context in its development? Traditional group development theory leaves little room for environmental influence on the course of development; all groups are predicted to go through the same steps, and all are predicted to suspend opinions of what they are about until they have thrashed that issue out through their own internal processes. Neither do these theories comment about development-linked changes in interaction between a group and its context. In contrast, the current findings suggest that the outside context may play a particularly important role in a group's developmental path at three points: the design of the group and two well-defined critical periods.

As noted, the speed with which distinctive patterns appear suggests the influence of materials imported into the group. The finding is congruent with, but does not test, a viewpoint from the group-performance research tradition. In that view, the *design* of a group—the composition of the team, the structure of the task, the contextual supports and circumstances under which the team is formed—precedes and conditions the interaction that transpires among members (Hackman, 1986). In terms of the current model, the pool of materials from which a team fashions its first framework is set by the design and designer of the group.

A critical period is a time in an organism's life within which a particular formative experience will take and after which it will not (Etkin, 1967). Though the analogy is imperfect, there appear to be two critical periods when groups are much more open to fundamental influence than they are at other times. The first is the initial meeting. As a time when the interaction in the group sets lasting precedents, it holds special potential to influence a team's basic approach toward its project.

The transition is the second chance. Not only did teams open up to outside influence at this point—they actively used outside resources and requirements as a basis for recharting the course of their work. The transition appears to be a unique time in groups' lives. It is the only period when the following three conditions are true at once: members are experienced enough with the work to understand the meaning of contextual requirements and resources, have used up enough of their time that they feel they must get on with the task, and still have enough time left that they can make significant changes in the design of their products.

In contrast, teams did not make fundamental changes of course in response to information from their contexts during phase 1 and phase 2, when ideas that did not fit with their approach to the task did not appear to register. That observation does not suggest that teams universally ignore or cut off environmental communication during phases 1 and 2, but it suggests that outsiders are unlikely to turn teams around during those times.

The three example teams showed how groups may insulate themselves from environmental input at some times yet seek it during transitions—partly to get help limiting their own choices and moving forward, partly to increase the chances that their product will succeed in their environment. That pattern has interesting implications for the theoretical debate between population ecologists, who argue that environments "select," and advocates of resource dependency, who argue that systems "adapt." Researchers have already observed that organizations change through alternating periods of momentum and revolution (Miller & Friesen, 1984; Tushman & Romanelli, 1985). Further, organizations commonly construct time-related goals for productivity and growth, such as monthly, annual, and five-year plans, as well as possibly much longer-term objectives for their ultimate growth schedules. It appears worth investigating (1) whether pacing or life cycle issues affect the timing or success of organizational revolutions and (2) how organization-environment communication, or lack of it, during revolutionary periods particularly affects outcomes. Interaction with an environment may be very likely to foster and shape adaptation at certain predictable times in a system's life cycle and unlikely to do so at other times. If its environment changes dramatically when an organization is also entering a change phase, that organization may be more likely to adapt. Organizations that are instead in a phase of inertia will be less able to respond and may be selected out. Since this study did not include interviews with external stakeholders or observation of them outside teams' meetings, more research is needed to study the effects of environmental influence attempts during phases 1 and 2, versus during transition.[10]

Limitations of the Study

This study must be interpreted with caution. It was hypothesis-generating, not hypothesis-testing; the model is expressly provisional. One person conducted the analysis. As Donnellon, Gray, and Bougon (1986: 54) pointed out, the use of a single judge is important in discourse analysis, where the goal is to create an in-depth understanding of a whole event, but it increases the need for further research. There are also limits on the type of group to which the findings might apply. The transition involves groups' revising their understanding of and approach to their work in response to time limits. Accordingly, results should apply only to groups that have some leeway to modify their work processes and must orient themselves to a time limit. The length of the time span should not matter, though that is a question for empirical research.

Comparison with Past Findings

Why did this study result in findings so different from the findings of previous group development research? An important possibility is that the paradigm of unitary stage theory directed previous researchers' attention away from phenomena of special interest here. The developmental stage paradigm naturally focuses on the stages themselves, not on the process of change, since all systems are assumed to progress through the same stages in a forward direction. Such events as T-groups' characteristic revolt against the leader may be midpoint transitions, but past researchers did not note their timing or think in such terms. The theoretical prominence of the environment is also limited in the traditional models because is does not alter the basic sequence of stages. In contrast, punctuated equilibrium paradigms direct attention to periods of stability and to change processes, provoking questions about what happens within a team and between a team and its context during the short periods of time when systems are especially plastic and labile. Finally, the traditional paradigm raised different questions about group process. Many past studies conceptualized and examined group process at the microanalytic level of members' sentence-by-sentence rhetoric and speech patterns, whereas this study encompassed the more macroanalytic level of group actions, such as revising plans and contacting outside supervisors. Such actions would be undetectable to traditional coding schemes, as would one of the most important clues in the study, the one-shot comments about time that group members made as they began their transitions.

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[10] Gersick (1983) does include and discuss additional evidence of teams dismissing or not understanding outside requirements during phases 1 and 2.

The work of Poole (1983a, 1983b) suggests another possibility. He found that groups developed decisions within single meetings in multiple, not unitary, sequences, and proposed that past research did identify the key components of the development of group decisions, but that outside the controlled conditions and broad category systems of past laboratory research, it is possible to see that groups treat those components as blank spaces on an outline. They may fill in the blank spaces in a variety of sequences, depending on a host of task-related variables. Finally, the nature of its task affects the development of a group (Poole, 1983b). Past research has concentrated on a few types of group and tasks, with little attention to naturally-occurring groups responsible for creating concrete products for outside use and evaluation.

Implications for Action

The results reported here have many implications for managers working with groups. Although traditional theory implies that group leaders have plenty of time at a project's beginning before the group will choose its norms and get to work, this model implies that a group's first meeting will set lasting precedents for how the group will use the first half of its time. That finding suggests that group leaders prepare carefully for the first meeting, and it identifies a key point of intersection between group development and group-effectiveness research on team design. According to traditional theory, a group must also expect an inevitable storming stage. In contrast, the proposed model suggests that groups use the first meeting to diagnose the unique issues that will preoccupy them during phase 1.

The proposed model also suggests that a group does not necessarily need to make visible progress with a steady stream of decisions during phase 1 but does need to generate the raw material to make a successful transition. For example, groups that begin with a clear plan may do best to use phase 1 to flesh out a draft of that plan fully enough to see its strong and weak points at the transition. Groups that begin with a deep disagreement may do best to pursue the argument fully enough to understand by transition what is and is not negotiable for compromise. A leader who discovers at the first meeting that the group adamantly opposes the task may do best to decide whether to restart the project or help the group use phase 1 to explore the issues enough to determine, at transition, whether it can reach an acceptable formulation of the task. In such a case, a leader might want to redefine a group's task as a preliminary diagnostic project, with a shorter deadline. Once past the first meeting, phase 1 interventions aimed at fundamentally altering a group, rather than at helping it pursue its first framework more productively, may be unsuccessful because of members' resistance to perceiving truly different approaches as relevant to the concerns that preoccupy them.

The next new implication of the present model is that the midpoint is a particularly important opportunity for groups and external managers to renew communication. Again, note that the teams and supervisors studied did not all automatically do this or do it uniformly well. The special challenge of the transition is to use a group's increased information, together with fresh input from its environment, to revise its framework knowledgeably and to adjust the match between its work and environmental resources and requirements. This is another point of special intersection between group development and group-effectiveness research, since that research should be especially helpful in evaluating and revising a group's situation (Hackman & Walton, 1986). Further research is needed to explore ways to manage the transition process productively.

Once the transition is past, the major outlines of a group's project design are likely to be set; the most helpful interventions are likely to be aimed at helping the group execute its work smoothly. For external managers, this may be an especially important time to insure a group's access to needed resources.

CONCLUSIONS

The concepts highlighted here center around the broad theme of change over time in groups' lives. This kind of knowledge about groups is particularly needed now, given the increasing importance of groups in high-commitment organizations (Walton & Hackman, 1986) and in young, high-technology industries (Mintzberg, 1981).

The pattern of continuity and change, observed directly in eight groups, also matches a punctuated equilibrium pattern that others have postulated at different levels of analysis. These formulations range from Kuhn's (1962) concept of normal science versus scientific revolution, through Abernathy and Utterback's (1982) description of radical versus evolutionary innovation in industries and Miller and Friesen's (1984) model of momentum and revolution in organizations, to Levinson's (1978) theory of adult development as alternating periods of stability and transition. Findings about small groups cannot be generalized directly to individual lives, growing organizations, or developing industries; nevertheless, knowledge about group development should stimulate and enrich our learning about inertia and change in human systems across those levels of analysis.

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IMPRESSION MANAGEMENT: AN OBSERVATIONAL STUDY LINKING AUDIENCE CHARACTERISTICS WITH VERBAL SELF-PRESENTATIONS

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This study used direct observation to investigate the relationship between audience characteristics and the verbal self-presentational behaviors of 34 school principals. The results revealed that the principals presented themselves differently with high- and low-status, familiar and unfamiliar, and internal and external audiences. Differences in the principals' self-presentations during dyadic and group interactions were also observed. The implications of these findings for research on impression management behaviors and management theory are considered.

Impression management involves the behaviors people exhibit to create and maintain desired impressions (Schlenker, 1980). Because managers occupy highly visible positions, it is particularly important for them to manage their impressions on others (Wortman & Linsenmeier, 1977). Indeed, the images managers portray influence their interactions with others (Pfeffer, 1981). Many authors of popular, practitioner-oriented works have recognized the importance of impression management skills (e.g., Carnegie, 1940; Ringer, 1976). In addition, a considerable amount of theoretical and empirical attention has been devoted to the study of impression management in the field of social psychology (Jones, 1964; Schlenker, 1980; Schneider, 1981). However, few researchers have focused on impression management behaviors in organizational settings (Allen, Madison, Porter, Renwick, & Mayes, 1979; Caldwell & O'Reilly, 1982; Kipnis, Schmidt, & Wilkinson, 1980).

The most prominent means of managing impressions is through self-presentation, which Schneider defined as "the manipulation of information about the self by the actor" (1981: 25). Such presentations may involve verbal behavior, nonverbal behavior, and artifactual displays such as dress and office decor. In addition, Schneider (1981) identified purposive behaviors as a larger class of self-presentational behaviors that involve the application of verbal, nonverbal, and artifactual behaviors to the pursuit of an actor's interaction objectives. Ingratiation, for example, is a "class of strategic behav-

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iors illicitly designed to influence a particular other person concerning the attractiveness of one's personal qualities" (Jones, 1964: 11). Other types of purposive behaviors include intimidation, self-promotion, exemplification, and supplication. Through these behaviors, individuals may seek to be perceived as dangerous, competent, morally worthy, and pitiful, respectively (Jones & Pittman, 1980).

In his discussion of management as symbolic action, Pfeffer (1981) argued that language is the vehicle through which managers rationalize and legitimize their activities. Thus, managers use verbal behavior as a means of communicating desired images of themselves and their organizations. To date, however, the few management researchers who have investigated impression management have focused their attention on ingratiation rather than on verbal self-presentations. Kipnis and Vanderveer (1971), for example, manipulated ingratiation in a laboratory experiment and demonstrated that supervisors rewarded ingratiating subordinates more than their noningratiating colleagues. Allen and colleagues (1979) used structured interviews to study organizational politics and found that over 25 percent of the managers questioned identified ingratiation as a political tactic they frequently encountered. Although those studies provide insight into the occurrence and effects of ingratiation, the specific verbal self-presentational behaviors people use to gain audience approval remain unexplored. Moreover, the nearly exclusive reliance on laboratory experiments and survey research designs that has prevailed further limits knowledge of the behaviors managers use to create and maintain desired impressions in everyday life. In an effort to address those limitations, this study used direct observation to examine the relationship between audience characteristics and verbal self-presentational behaviors.

Verbal Self-Presentational Behaviors

The general category of verbal self-presentation encompasses a variety of specific impression management behaviors. Social scientists have emphasized six verbal self-presentational behaviors: self-descriptions, accounts, apologies, entitlements and enhancements, flattery, and favors (Jones, 1964; Jones & Wortman, 1973; Schlenker, 1980; Wood & Mitchell, 1981). Self-descriptions are actors' verbalizations about such personal characteristics as their traits, abilities, behavior patterns, feelings, opinions, and personal lives. Self-descriptions can include positive, negative, or neutral information about the actor. Accounts "are explanations of a predicament-creating event designed to minimize the apparent severity of the predicament" (Schlenker, 1980: 136). In accounts, actors may deny events occurred, deny causing events, offer excuses, or justify incidents. Apologies "are designed to convince the audience that the undesirable event should not be considered a fair representation of what the actor is 'really like' " (Schlenker, 1980: 154). When apologizing, actors admit responsibility for an undesirable event and simultaneously try to reduce its negative repercussions. Actors use entitlements and enhancements as acclaiming tactics "designed to explain a desirable event in a way that maximizes the desirable implications for the actor" (Schlenker, 1980: 163). Entitlements are designed to maximize an actor's apparent responsibility for an event; enhancements are designed to maximize the favorability of an event itself. Flattery occurs whenever actors compliment others about their virtues in an effort to make themselves appear perceptive and likeable (Jones, 1964). Finally, favors involve doing something nice for someone to gain that person's approval (Jones, 1964).

In light of the importance and salience of verbal self-presentational behaviors, the current study focused on the six categories of behavior just described. We added a seventh category, organizational descriptions, because managers often use descriptions of their organizations to manage impressions and legitimize organizational decisions and policies (Pfeffer, 1981). Indeed, the manner in which managers describe organizational activities, personnel, and accomplishments has key implications for their own images, since they are typically viewed as the symbolic heads of their work units. The Appendix provides definitions and examples of the seven types of verbal self-presentation examined in this study.

Influences on Verbal Self-Presentations

Verbal self-presentations are influenced by the complex interaction of actor, audience, and environment. The environment provides the general setting and context for the actor's performance (Davis, 1984). Additional cues for actors' behavior are provided by the audience for whom they perform (Goffman, 1959). A variety of cognitive processes, including actors' perceptions, attributions, motives, and expectations influence the manner in which actors interpret situations and their roles (Schneider, 1981). In addition, actors' self-concepts limit the number of presentations that they consider authentic and viable (Schlenker, 1980). Actors also frequently evoke cognitive scripts to guide their self-presentations by specifying episodic series of events that are expected to occur (Gioia & Manz, 1985). Finally, individual differences, such as Machiavellianism (Christie & Geis, 1970), self-monitoring ability (Snyder, 1979), and needs for social approval (Crowne & Marlowe, 1964) mediate actors' responses.

HYPOTHESES

The discussion in the preceding section highlights many influences on self-presentations; an examination of all of those factors was, however, beyond the scope of this study. The current research was limited to testing hypotheses regarding differences in verbal self-presentations to high- and low-status, familiar and unfamiliar, dyadic and group, and internal and external audiences. Available impression management theory and research guided the development of the hypotheses. Unfortunately, the relative paucity of research made it difficult to advance hypotheses regarding specific behaviors. Thus, the current study was exploratory, and the hypotheses developed are general.

Status of Audience

In his classic work, *The Presentation of the Self in Everyday Life*, Goffman (1959) suggested that the status of an audience profoundly influences self-presentations. Research indicating that actors tend to be concerned more about impressing people in high-status positions than about impressing people in low-status positions (Allen et al., 1979; Jones, Gergen, & Jones, 1963) has confirmed Goffman's suggestion. Those findings imply that high audience status heightens actors' awareness of their image and consequently encourages verbal self-presentational behaviors. Research on ingratiation indicates that self-enhancing statements (Jones et al., 1963; Ralston, 1985) and flattery (Kipnis & Vanderveer, 1971) occur more often in the presence of high-status audiences than in the presence of low-status audiences. Although researchers have not investigated the manner in which status relates to self-descriptions, accounts, apologies, and favors, it appears likely that audience cues that elicit self-enhancements and flattery will also encourage the use of other approaches to image management.

> *Hypothesis 1: Managers exhibit more numerous verbal self-presentational behaviors for greater amounts of time in the presence of high-status audiences than in the presence of low-status audiences.*

Familiarity of Audience

Although conceptual studies have suggested that actors present themselves differently to familiar and unfamiliar audiences (Jones & Wortman, 1973; Weary & Arkin, 1981), there is little empirical research on this relationship. Nevertheless, Jones and Wortman suggested that, although actors are highly concerned about the impressions their acquaintances have of them, such concerns decrease as an audience's opinions of an actor become better known. Since the impressions of strangers are not yet formed, actors are likely to be particularly concerned about creating positive first impressions during interactions with unfamiliar audiences. Research on first impressions indicates that this concern is justified, since initial impressions appear to be highly durable and resistant to change (Kleinke, 1975).

> *Hypothesis 2: Managers exhibit more numerous verbal self-presentational behaviors for greater amounts of time in the presence of unfamiliar audiences than familiar audiences.*

Size of Audience

The size of an audience is a third variable likely to influence self-presentations. Although there is apparently no empirical evidence of a relationship between audience size and impression management behavior, communication research indicates that the number of people present influences both verbal and nonverbal messages (Bostrom, 1970; Wilmot, 1979). Bostrom demonstrated that the number of possible communications between members increases dramatically as the size of a group increases. Indeed, moving from a dyadic interaction to a three-person group results in an increase from two to nine potential interactions. This finding suggests that actors receive more cues to manage impressions during group exchanges than during dyadic exchanges. Bostrom (1970) also found that the actual pattern of interactions in groups differed significantly from the pattern that would be expected on the basis of a statistical model of interactions. Although members of groups continue to interact one-to-one, they nevertheless direct verbalizations to the group as a whole more often than would be theoretically expected. That finding implies that the total amount of verbal self-presentational behavior is likely to be greater during group interactions than during dyadic interactions.

> *Hypothesis 3: Managers exhibit more numerous verbal self-presentational behaviors for greater amounts of time during group interactions than during dyadic interactions.*

Internal Versus External Audiences

A fourth audience characteristic that may influence impression management behavior is whether an audience is internal or external. Pfeffer noted that the symbolic activities of management are "directed both internally, to produce collective action, and externally, as part of a process of legitimizing the organization in its larger social context" (1981: 21). Insight into the differences between interactions with internal and external audiences can be gained from Goffman's (1959) dramaturgical notion of a team performance. All members of an organization are part of a team and thus often engage in coordinated performances when they present themselves to non–team members. In contrast, Goffman viewed interactions between team members as occurring "backstage" or "behind the scenes," where members relax and "let their hair down." When his dramaturgical analogy is applied to organizations, it suggests that organizational members will be more likely to perform before outsiders than before fellow team members. Support for that prediction is provided by Mintzberg's (1973) analysis of managerial interactions, which revealed that communications with external audiences involved exchanges of organizational information, public relations, and ceremonial events, whereas interactions with internal audiences typically involved operational activities.

> *Hypothesis 4: Managers exhibit more numerous verbal self-presentational behaviors for greater amounts of time in the presence of external than internal audiences.*

METHODS

Subjects

A population of educational managers—principals of schools—was used to investigate the four hypotheses. We considered a fairly homogeneous group of managers like principals appropriate in that homogeneity serves as a natural control by reducing between-subject variability, thus making detection of the differences associated with the independent variables more probable. Although it can be argued that principals are not typical managers, the results reported for several observational studies (e.g., Kurke & Aldrich, 1983; Larson, Bussom, & Vicars, 1981; Mintzberg, 1973; Morris, Crowson, Hurwitz, & Porter-Gehrie, 1981) have demonstrated that the nature, frequencies, and durations of many of the behaviors of principals are similar to those of other managers. Moreover, the differences between the behaviors of principals and other managers may be no greater than the differences between the behaviors of such other subgroups of managers as bank presidents, manufacturing superintendents, or restaurant managers.

The population consisted of all principals of secondary and primary schools included in the public school system of the state in which the study was conducted. As part of a larger study commissioned to describe the behaviors of effective educational managers (Martinko & Gardner, 1984b), we employed a purposive sampling procedure to select 50 subjects from the population of school principals (Lake, 1982). To ensure as representative a group of principals as was practically possible, we used a quota system of sampling to select individuals across eight demographic variables and one performance index. The sample included principals from each level of these eight variables: principal's gender, grades included in school, its geographic location, number of schools in a district, school's staff size, school's socioeconomic level, its ethnic mix, and the degree of urbanization of the surrounding area. We chose those variables because they are key demographic characteristics accounting for differences in principals' behavior and school activities (Ford & Slocum, 1977; Havighurst & Levine, 1975; Herriot & Hodgkins, 1973). The quota system ensured that demographic biases in the sample that could distort the findings were minimized. Archival data were used to classify the socioeconomic status of the schools as high, medium, or low[1] and the ethnic mix of students as predominantly white or minority, or mixed.[2] Relative urbanization was determined by asking individuals familiar with the schools to classify them as urban, rural, or suburban. To ensure that all the principals in the sample were reasonably competent, we developed an index of performance, and the sample was divided into high and moderate performers.[3]

The data for the larger study were collected by 41 trained observers who were each assigned to observe either one or two principals for ten randomly selected days per principal. The observers developed narrative protocols of the principals' behaviors and coded them according to 11 predetermined classification systems. At the onset of the larger study, no hypotheses were advanced regarding impression management. As part of that study, we conducted reliability checks for 34 of the 41 trained observers. Since we observed different principals on each of the 34 days during which we performed reliability checks, a data base consisting solely of our observations of 34 principals was created. We used this data base to explore the hypotheses of the current study for three reasons: (1) using a smaller but systematic subset of the data substantially reduced both the time and the resources needed for secondary coding, (2) the use of data from two rather than 41 observers substantially reduced extraneous variance, and (3) our protocols were somewhat more detailed than some other observers' and thus more amenable to secondary coding. Table 1, a summary of the demographic characteristics for the current sample, reveals that sufficient numbers of principals from all levels of the demographic variables are represented. In addition, 19 high-performing and 15 moderate-performing principals were included. The subjects included 20 men and 14 women. On the average, subjects had been the principals of their current schools for 4.3 years.

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[1] The break points for high, medium, and low socioeconomic status were 0 to 25 percent, 26 to 60 percent, and over 60 percent low-income students.

[2] Schools with over 71 percent white students were classified as predominantly white, and schools with over 34 percent black or over 41 percent Hispanic students were classified as predominantly minority; all other schools were classified as ethnically mixed.

[3] Performance was used as a control variable to ensure that all subjects were competent principals. Lake (1982) developed five criteria to identify the principals' performance levels: (1) actual versus predicted student performance on minimal competency exams, (2) absolute rankings on nationally normed achievement tests, (3) superintendents' rankings of schools, (4) superintendents' rankings of principals, and (5) three years tenure.

Organizational Entry and Observers

As indicated above, the sample for this study is a subset of a larger sample (Martinko & Gardner, 1984b). Within the context of the larger study, all of the principals met with us and with a state official from the department of education; we solicited their voluntary participation and explained that the purpose of the study was to identify the behaviors of effective principals

TABLE 1
Demographic Characteristics of the Schools of Principals Studied[a]

Variables	Categories	Percentages
Grades included	Primary	64.7
	Secondary	35.3
Location	North Florida	50.0
	South Florida	50.0
Size of district	Small (0–50 schools)	58.8
	Large (over 50 schools)	41.2
Size of staff	Small (0–35 members)	41.2
	Medium (36–70 members)	35.3
	Large (over 70 members)	23.5
Socioeconomic level	High income	35.3
	Medium income	29.4
	Low income	35.3
Ethnic mix of school	Mostly white	35.3
	Minority	38.2
	Ethnically mixed	26.5
Degree of urbanization	Urban	29.4
	Suburban	47.1
	Rural	23.5

[a] $n = 34$.

through naturalistic observation. We asked the principals to ignore the observers and engage in their normal work routines. They were not informed of their performance levels or the days on which they would be observed. All principals who were asked agreed to participate.

Each of us participated in at least 50 hours of practice with the observation procedures before we collected the data described here. Each principal in the sample was observed for one day, with a mean duration of 6.82 hours. To ensure an unbiased data collection procedure, we tried to balance the number of principals across observers and the demographic and performance variables. One researcher observed 18 subjects and the other 16 subjects. We randomly selected the observation dates, using a table of random numbers. We arrived at the schools unannounced to avoid providing the principals with an opportunity to prepare for our visits. The data were collected over a two-year period beginning in April 1981 and ending in March 1983.

To assess the comparability of the data, we performed profile analyses contrasting the verbal self-presentational behaviors recorded by the two researchers. As there were no significant differences related to observers in either the frequencies of self-presentational behaviors ($F_{5,28} = 1.359, p > .05$) or the amounts of time ($F_{5,28} = 1.963, p > .05$) devoted to these behaviors, there do not appear to be systematic differences in the data collected by the two researchers.

Observation and Coding Processes

A direct, nonparticipatory, and unobtrusive observation procedure, similar to the structured observation techniques used by Mintzberg (1973), Morris and coauthors (1981), and Larson and colleagues (1981), was employed (Martinko & Gardner, 1984a, 1984b). During observations, we minimized our interactions so as to avoid interfering with a principal's work routine. The data collection instrument contained columns for recording the time, the place, and the duration of an event, the number of people interacting, the titles of the people associated with the event, and a detailed narrative description of the principal's activities. To facilitate coding and analysis, we grouped each principal's activities into distinct events representing interrelated and interdependent sets of behaviors; an unscheduled meeting or a telephone call are examples. As a general rule, events began and ended whenever a change in participants or medium of communication occurred. We numbered all events, indicating the time at which they began and their duration in minutes.

The narrative descriptions of behavior were coded with two separate but related processes. The first entailed indicating if the audience involved in an event was (1) high- or low-status, (2) familiar or unfamiliar, (3) internal or external, and (4) an individual or a group. We coded an event's duration whether or not verbal self-presentational behaviors were displayed and summed the durations to calculate the total amounts of time each principal spent with the different audience types.

The second coding process focused *exclusively* on events during which the principals engaged in one or more of the self-presentational behaviors investigated. We coded all events involving those behaviors to indicate the audience's characteristics, the event's duration, and the verbal self-presentational behaviors exhibited. Operational definitions (see the Appendix) for the behaviors were developed by examining the literature on impression management and modifying the definitions to suit the research context. The behavior categories were not mutually exclusive, and the coders often coded more than one type of behavior for an event. If, for example, a principal exhibited a self-description, an organizational description, and flattery during an interaction with a parent, each behavior would be recorded. As we noted in a methodological review of structured observation (Martinko & Gardner, 1985), this practice results in more realistic analyses than does forcing behaviors into mutually exclusive categories.

Coders

Two doctoral candidates in management and communication and two master's degree candidates in management and anthropology coded the data. Three of the coders focused on either audience characteristics or verbal self-presentations exclusively, and the fourth coded both. All coders practiced until their level of intercoder agreement exceeded 80 percent.

Reliability Checks

The reliability checks involved the calculation of (1) interobserver-intercoder agreement, (2) intercoder agreement, and (3) intracoder agreement (Mitchell, 1979). Interobserver-intercoder agreement was the most comprehensive measure since it took into consideration the reliability of both the data collection and the coding processes. To obtain this measure, we simultaneously observed one principal for a day, and each set of our field notes were subsequently coded by different coders. This reliability check was performed for each of the two primary coding processes described in the previous segment. For the first process, which involved recording the amounts of time the principals spent interacting with specific audience types, the observer-coder teams agreed on the occurrence of events 72 percent of the time. Agreement on audience characteristics ranged from a low of 73 percent for status to a high of 92 percent for familiarity. For the second coding process, the percentage of events identified by both observer-coder teams as involving verbal self-presentational behaviors was 52. The percentage of agreement on event duration was 60, and the overall agreement on the behaviors was 58 percent. The primary reason for the lower percentages was the high degree of difficulty involved in obtaining agreement by both observers and coders on the precise occurrence and duration of events and behaviors. Frequently, the observers recorded the same behaviors but divided those behaviors into events differently, thus causing discrepancies in the coding of events' durations and the occurrence of behaviors within events. The agreement levels for the remaining categories ranged from a low of 85 percent for event time to a high of 100 percent for the distinction between internal and external audiences.

Intercoder agreement was checked by comparing the results of two different coders on the same randomly selected subsets of observational records. We used 5 protocols to check the first coding process and 12 for the second, with results indicating that the coders agreed on the occurrence of events 98 and 75 percent of the time, respectively. In addition, the level of agreement on audience characteristics for the two coding processes ranged between 90 and 98 percent. The overall level of agreement on verbal self-presentational behaviors was 70 percent. However, the intercoder agreements for accounts and favors were 33 percent and 0 percent, so we eliminated those behaviors from subsequent analyses.

Finally, intracoder agreement provided a measure of internal consistency. Each coder coded six randomly selected protocols a second time, at least two weeks after the first coding. This reliability check was performed for the second coding process only. The results indicated that the coders agreed with their prior identifications of events involving verbal self-presentational behaviors 83 percent of the time. The mean levels of agreement on audience characteristics and verbal self-presentational behaviors were 97 and 78 percent, respectively.

Since this study was exploratory and the procedures employed were conservative compared to more liberal measures reflecting nonoccurrence agreements (Harris & Lahey, 1978), the agreement percentages summarized are acceptable. Indeed, the reliabilities obtained compare favorably with the standard of .70 that Nunnally (1967) recommended for psychometric instruments. It is also noteworthy that ours is one of the few structured observation studies to employ any type of reliability checks (Martinko & Gardner, 1985). Thus, the comprehensive assessments of reliability represent one of the major strengths of this study.

Independent Variables

Status. People occupying positions high in status, such as superintendents, assistant superintendents, central administrative staff members, and department of education employees were classified as high-status audiences, and people in positions generally considered to be low in status, such as clerical, custodial, maintenance, and kitchen employees, were coded as low-status audiences. We classified all others, including peers, outsiders, parents, students, and teachers, as ambiguous-status audiences and excluded them from this analysis because they were not considered to be clearly high or low in status. In addition, we excluded 7 percent of the events coded because of insufficient information.

Familiarity. People whom a principal knew well were classified as familiar, and those with whom a principal was unacquainted were classified as unfamiliar. Familiar audiences included students, teachers, and parents with whom a principal was reasonably well acquainted. Unfamiliar audiences included parents of new students and job applicants. Three percent of the events coded were excluded from this analysis because of insufficient information.

Dyadic/group interactions. For all events, the maximum number of people present, including the subject, was recorded; however, people physically present but not actively involved in an event were not counted. If, for example, a principal was meeting with a student and a secretary was working in the background, the secretary was not counted. We classified interactions between a principal and one other person as dyadic and those between a principal and more than one other person as group.

Internal/external audiences. The titles of the people with whom a principal interacted were recorded and coded. Those other than staff members and students were classified as external audiences. Four percent of all events were excluded because of insufficient information.

Dependent Variables

The dependent variables were generated by dividing the number of events and the number of minutes during which the various verbal self-presentational behaviors were directed toward particular types of audiences by the total amount of time the principals spent interacting with those audiences. The resultant events-per-hour measure indicates the relative frequency of self-presentational behaviors, and the minutes-per-hour measure indicates the relative amount of time devoted to those behaviors. Relative measures were used to control for variations in the total amounts of time different principals spent interacting with the various types of audiences. Although the two measures are related and similar, they are not identical. Both measures are needed to assess properly the intensity and frequency of behavior in an exploratory study of this nature since there is little guidance from prior research regarding the measures most likely to establish empirical relationships.

To ensure that data from principals with limited opportunities to interact with a particular audience type did not bias or distort the analyses, we established five minutes of interaction between the principal and each audience type as a minimum criterion for inclusion of data in the analysis. All 34 principals provided data that met the criterion for low-status, familiar, dyadic, group, and internal audiences. However, in regard to high-status, unfamiliar, and external audiences, we excluded data that did not meet the interaction criterion; the respective numbers of principals for whom data was excluded were 13, 12, and 1.

Despite our efforts to remain unobtrusive, approximately 13 percent of the principals' interactions involved self-presentational behaviors directed toward the observers. We excluded such interactions from the analysis since observers would not ordinarily be part of the principals' work environment and the interactions were irrelevant to the purpose of the study.

Analyses

The multivariate technique of profile analysis (Johnson & Wichern, 1982) was employed to test the hypothesized relationships. Profile analysis contrasts multiple dependent measures obtained for two or more independent variables. We contrasted the profiles of verbal self-presentational behaviors for each level of the various types of audiences. The technique incorporates tests of two key hypotheses: (1) the coincidence hypothesis that there are no differences in the profiles and that they are in fact coincident; and (2) the interaction hypothesis that the profiles are parallel and do not differ in their shapes.

The test of the coincidence hypothesis is performed first. The interaction hypothesis is not tested if a researcher accepts the first hypothesis because profiles are parallel if they are coincident. If the interaction hypothesis is tested and rejected, it indicates that the profiles differ in shape as well as magnitude. We chose a .05 significance level for the two multivariate tests.

In addition to the multivariate tests, univariate ANOVAs were used to test for differences between profiles' means for particular categories. To control for alpha inflation, we used the Bonferroni method of simultaneous protection for each family of tests ($\alpha = .05$).

RESULTS

A total of 5,910 events, an average of 174 events per principal, were examined during the coding process. Of those events, 5,215, an average of 153 per principal, involved interactions with others. Principals exhibited verbal self-presentational behaviors during 437, or approximately 8.4 percent, of the total number of interactions recorded. Thus, the principals averaged 12.8 events involving verbal self-presentational behaviors per day.

On the average, the principals spent 2.73 hours per day with internal audiences, 1.26 hours with external audiences, 2.47 hours in dyadic interactions, 1.58 hours in group interactions, 0.24 hours with novel audiences, 3.74 hours with familiar audiences, 0.42 hours with high-status audiences, and 0.84 hours with low-status audiences. Table 2 provides summaries of the relative frequencies and amounts of time during which the various audience types served as targets for verbal self-presentational behaviors. For all audience types except low-status audiences, the most frequent and time-consuming category of behavior was organizational descriptions, followed by self-descriptions, entitlements and enhancements, flattery, and apologies. The pattern was similar for low-status audiences except for a reversal in the order of frequency for self- and organizational descriptions.

Table 3 provides a summary of the means, standard deviations, and Pearson product-moment correlations for each of the independent and dependent variables. We obtained the correlation matrix by assessing the amount of association between the variables across principals. The results reveal significant correlations between the independent variables of (1) status and familiarity, (2) status and dyadic versus group interactions, (3) status and internality versus externality, and (4) familiarity and internality versus

TABLE 2
Verbal Self-Presentational Behaviors Directed Toward Specific Audience Types

	Audience Characteristics															
	Means		s.d.		Means		s.d.		Means		s.d.		Means		s.d.	
Categories of Behaviors[a]	High-Status	Low-Status	High-Status	Low-Status	Familiar	Unfamiliar	Familiar	Unfamiliar	Dyadic	Group	Dyadic	Group	Internal	External	Internal	External
Self-descriptions																
Frequency	1.94	1.48	3.02	1.85	1.05	1.59	2.16	1.12	2.04	0.92	1.53	0.97	1.32	2.03	1.04	1.93
Amounts of time	5.66	1.58	9.58	2.40	3.85	5.60	8.70	5.47	5.59	4.89	5.94	7.83	2.63	11.14	3.65	12.91
Organizational descriptions																
Frequency	2.71	1.25	3.29	1.59	2.43	1.61	2.88	1.17	1.97	1.32	1.39	0.99	1.44	2.54	1.70	1.82
Amounts of time	9.89	1.61	15.10	2.50	7.72	6.12	13.84	6.01	5.63	6.56	5.48	8.23	3.41	12.83	4.01	13.07
Entitlements/ Enhancements																
Frequency	1.01	0.21	2.41	0.65	1.10	0.26	2.14	0.51	0.25	0.37	0.46	0.71	0.20	0.44	0.34	0.91
Amounts of time	4.44	0.07	12.82	0.21	5.59	1.13	12.87	2.62	0.67	2.67	1.59	5.86	0.75	2.00	2.50	4.40
Apologies																
Frequency	0.00	0.11	0.00	0.39	0.00	0.11	0.00	0.17	0.18	0.06	0.37	0.19	0.13	0.23	0.23	0.73
Amounts of time	0.00	0.34	0.00	1.75	0.00	0.23	0.00	0.51	0.31	0.08	0.86	0.33	0.21	0.38	0.57	1.30
Flattery																
Frequency	1.09	0.08	2.30	0.26	0.00	0.31	0.00	0.43	0.24	0.35	0.46	0.48	0.25	0.47	0.41	0.93
Amounts of time	0.68	0.06	1.58	0.22	0.00	0.37	0.00	0.73	0.20	0.49	0.49	1.31	0.31	0.88	0.58	2.01

[a] Frequency and amounts of time were measured by the number of events per hour and the number of minutes per hour, respectively.

TABLE 3
Summary Statistics and Pearson Product-Moment Correlations for Independent and Dependent Variables[a]

Variables	Means[d]	s.d.	1	2	3	4	5	6	7	8
Independent Variables										
Audience characteristics										
1. Status[b]	.13	.34								
2. Familiarity	.04	.19	.27***							
3. Dyadic/group	.21	.41	.08**	–.01						
4. Internality/externality	.10	.92	.80***	.12***	–.01					
Dependent Variables										
Verbal self-presentations										
5. Self-descriptions[c]	.50	.50	–.11	–.03	–.11*	.05				
6. Organizational descriptions	.56	.50	.18*	.12**	.05	.12	–.25***			
7. Entitlements and enhancements	.10	.30	.20*	.18***	.14**	.10*	.00	.12**		
8. Apologies	.04	.19	–.13	–.04	–.04	–.02	–.17***	.12**	–.06	
9. Flattery	.09	.29	.14	–.08	.13**	.01	–.27***	–.31***	–.03	–.06

[a] Although the Pearson product-moment correlation was originally designed for interval-measured variables, several social science methodologists have argued that Pearson correlation coefficients can be appropriately employed with ordinal data (Labovitz, 1970). We obtained the correlation matrix by assessing the amount of association between variables across principals. Thus, the units of analysis are the individual events included in the data base.

[b] The independent variables were coded as follows: low-status, familiar, dyadic, and internal audiences = 0; high-status, unfamiliar, group, and external audiences = 1.

[c] The dependent variables were coded as follows: not exhibited during the event = 0; exhibited during the event = 1.

[d] For the independent variables, n's ranged from 1,429 to 4,438, depending on the number of missing values excluded; for the dependent variables, the range was from 113 to 437.

*$p < .05$ one-tailed test.

**$p < .01$ one-tailed test.

***$p < .001$ one-tailed test.

externality. However, with the exception of status and internality v externality, none of these variables are strongly associated.[4]

To interpret the high positive correlation between status and inter versus externality, it is important to recognize that only a third (1,429 4,256) of the interactions that were coded for the internal/external va were coded for audience status. The remaining two thirds of the intera involved exchanges with internal or external audiences that were not fied as either high or low in status. Consequently, the high correlati tween the two variables is somewhat misleading since internal audi were often not coded as low-status and external audiences were oft coded as high-status. The high correlation arises from the exclusion of ing values—in this case ambiguous status audiences—from the correla analysis. When we include ambiguous status audiences, the correlati tween the variables falls to .10. Thus, the association between these var can best be summarized as follows: low-status audiences tend to be int and high-status audiences tend to be external. The association do operate in reverse, however, since internal and external audiences are likely to be classified as ambiguous status audiences than as high or lo the two variables appear to be conceptually and categorically distin analyzed their relations with verbal self-presentation separately.

Table 3 also includes the correlations between the independe dependent variables for the purpose of facilitating future meta-ana However, since we calculated the correlations for all events across prin they are less meaningful than the omnibus profile analyses that em individual principals, rather than individual events, as the units of an Our examination of the relationships between the independent and d dent variables is therefore confined to the more conservative profile an

Finally, Table 3 includes the correlations between the depe variables. The finding that several verbal self-presentational behavio significantly intercorrelated at moderate levels indicates that princip ten use more than one such behavior during a single event.

Profile Analyses

Table 4 provides a summary of the results of the profile analyses. O the coincidence tests for relative amounts of time revealed that the p of verbal self-presentational behaviors differed significantly for hig low-status, familiar and unfamiliar, and internal and external audi Furthermore, the coincidence tests for relative frequencies suggested t profiles of verbal self-presentational behaviors directed toward famili unfamiliar audiences and occurring during dyadic and group intera were significantly different. There were no significant differences, ho in the amounts of time spent engaging in verbal self-presentational beh during dyadic and group interactions. Similarly, the frequencies with

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[4] Nie, Hull, Jenkins, Steinbrenner, and Bent (1975) cautioned that, when a sample (n > 1,000), as in the present case, the magnitude of a correlation is more meaningful significance level since weak associations can be significant.

TABLE 4
Summary of Profile Analyses

			Dependent Variables[c]				
Audiences	Coincidence Test[a]	Interaction Test[a,b]	Self-Descriptions	Organizational Descriptions	Entitlements and Enhancements	Apologies	Flattery
Low/high status							
Frequency[d]	1.94						
Amounts of time	3.48*	3.47*		+			
Familiar/unfamiliar							
Frequency	6.93***	4.14**				–	–
Amounts of time	2.93*	1.94					
Dyadic/group							
Frequency	4.90***	5.83***	–				
Amounts of time	1.99						
Internal/external							
Frequency	1.72						
Amounts of time	3.37**	4.25**	+	+			

[a] Rao's F-ratio approximation was used in testing the coincidence and interaction hypotheses. This statistic is used when multivariate tests of centroid equality for several groups are required, as in these profile analyses. For a complete discussion of this statistic, see Rao (1952).

[b] The test of the interaction hypothesis is only performed when the coincidence hypothesis is rejected.

[c] Differences in the category means for specific self-presentational behaviors were assessed post-hoc using one-way ANOVAs and the Bonferroni method of simultaneous protection.

[d] Frequency and amounts of time were measured by the number of events per hour and the number of minutes per hour, respectively.

* $p < .05$

** $p < .01$

*** $p < .001$

principals directed verbal self-presentational behaviors toward low- and high-status and internal and external audiences did not differ significantly.

Tests of the interaction hypothesis were performed in all cases in which we rejected the coincidence hypothesis. The interaction hypothesis was rejected for all analyses except the one performed for time spent directing self-presentations toward familiar and unfamiliar audiences. The significant interactions indicate that the profiles differed in shape as well as in magnitude.

Table 4 also includes a summary of the findings obtained from the post hoc univariate ANOVAs that we used to identify differences in specific self-presentational behaviors related to audience characteristics. Despite the significant differences in profiles revealed by five of the eight omnibus analyses, relatively few of the post hoc analyses met the Bonferroni criterion for significance. The results for self-descriptions, however, suggest that principals describe themselves more frequently during dyadic interactions than during group interactions and that they describe themselves for greater amounts of time when in the presence of external, rather than internal, audiences. They exhibited organizational descriptions for approximately four times as much time (see Table 2) when in the presence of high-status and external audiences than when in the presence of low-status and internal audiences. Finally, the analyses performed for familiarity indicated that, contrary to predictions, the principals apologized and flattered familiar audiences more often than unfamiliar audiences.

Table 5 provides an illustration of a complete profile analysis for time spent directing verbal self-presentational behaviors toward low- and high-status audiences.

DISCUSSION

The results provide mixed support for the hypotheses investigated. As predicted, significant differences emerged regarding the ways in which principals presented themselves to different types of audiences. However, familiarity was the only audience characteristic related to differences in both the frequency with which and the amount of time during which the subjects exhibited verbal self-presentational behaviors. In addition, we identified few of the predicted relationships between specific behaviors and audience characteristics. Furthermore, the differences obtained for variables of status and internality versus externality were the only ones to occur in the hypothesized direction. In contrast, audience familiarity was related to the frequencies of apologies and flattery in the direction opposite to that of our predictions. The finding that principals described themselves for greater amounts of time during dyadic interactions than during group interactions is likewise not in the hypothesized direction. Together, the lack of convergence of the frequency and amount-of-time analyses and the failure to obtain support for many of the predicted relationships suggest that the results should be interpreted with caution.

TABLE 5
Profile Analysis Test of the Coincidence Hypothesis for Amount of Time by Audience Status

Behaviors	Sum of Squares (Hypothesis)	Sum of Squares (Error)	*df* (Hypothesis)	*df* (Error)	Mean-Square (Hypothesis)	Mean-Square (Error)	F^a
Self-descriptions	216.02	2124.21	1	53	216.02	40.08	5.39
Organizational descriptions	890.80	5000.53	1	53	890.80	94.35	9.44^b
Entitlements and enhancements	247.82	3452.63	1	53	247.82	65.14	3.80
Apologies	1.48	104.07	1	53	1.48	1.96	0.75
Flattery	5.97	53.73	1	53	5.08	1.02	5.00

[a] Rao's approximate $F_{5,49} = 3.48$, $p < .01$, for the omnibus test of the coincidence hypothesis; Rao's approximate $F_{4,50} = 3.47$, $p < .05$, for the omnibus test of the interaction hypothesis.

[b] Post hoc Bonferroni tests revealed significant differences between groups for this behavior only.

In an effort to facilitate interpretation, we reexamined the relevant management and impression management literatures to assess the consistency of our findings with those of prior research. That review revealed several reasonable post hoc explanations for the relationships identified. Many of the results can be interpreted in terms of Mintzberg's (1973) theory of managerial roles. The means summarized in Table 2 reveal that organizational and self-descriptions were the most frequent and time-consuming verbal self-presentational behaviors exhibited. In Mintzberg's work, the frequently used managerial roles of disseminator and spokesperson require managers to describe themselves and their organizations to others. Thus, the predominance of descriptive statements may simply be a function of role requirements.

The results obtained for status suggest that high-status audiences are the preferred targets for organizational descriptions. However, some caution should be exercised in interpreting this finding since low-status audiences tended to be insiders, and high-status audiences tended to be outsiders. Additional research is needed to determine if the differences observed are related to status, the internal or external standing of an audience, or the combination of the two variables. Nevertheless, this finding was predicted and is consistent with the ingratiation literature we reviewed in developing the hypotheses (Kipnis & Vanderveer, 1971; Ralston, 1985). We can also interpret this relationship in terms of Mintzberg's (1973) role theory, which suggests that managers are especially likely to serve as organizational spokespeople when interacting with high-status audiences. Indeed, maintaining their school's image with the central administrative staff appeared to be a major responsibility of the principals we observed.

Similarly, the finding that the principals spent four times as much time describing themselves or their organizations to external audiences than to internal audiences is consistent with prior investigations into the spokesperson role (Martinko & Gardner, 1984b; Mintzberg, 1973; Morris et al., 1981). The current study extended that research by documenting the frequencies and time spent describing personal and organizational characteristics to outsiders.

Although the findings obtained for audience familiarity were not anticipated, they are nevertheless consistent with the results of a recent study by Bohra and Pandey (1984). They investigated the manner in which people ingratiate themselves with strangers, as opposed to friends. Although there were no differences for several ingratiation tactics, the subjects reported using enhancement of others (flattery) more often with friends than with strangers. Bohra and Pandey concluded that some ingratiation tactics are equally useful with all targets but that audience familiarity is a critical consideration for other tactics. They suggest that "other-enhancement is less risky with an acquaintance because a less embarrassing situation is created for the target if any unwarranted compliments are used by the ingratiator" (1984: 222). That explanation applies equally well to the finding that principals flatter familiar audiences more often than unfamiliar audiences.

Because the relationship between apologies and audience familiarity has not been previously investigated, it is more difficult to explain the finding that principals apologized more to familiar audiences than to unfamiliar audiences. One potential explanation is that principals may have greater obligations to familiar audiences. Since familiar audiences have by definition previously interacted with a principal, they have had at least one more opportunity than unfamiliar audiences to secure obligations. Consequently, the likelihood is greater that a failure to meet obligations may necessitate an apology.

As noted, we did not anticipate the finding that principals described themselves more often during dyadic interactions than during group interactions. Indeed, on the basis of Bostrom's (1970) research, we predicted that self-presentational behaviors would occur more frequently in groups. However, a reexamination of Bostrom's (1970) study suggested that its results and those of the current study are not necessarily incompatible. We based our initial prediction on Bostrom's finding that, from a strictly mathematical perspective, the number of potential opportunities for members to communicate increases with group size. However, Bostrom also found that in actual exchanges, individuals have fewer opportunities to communicate in larger rather than smaller groups because they experience greater competition for time. That suggests principals may have described themselves more often during dyadic exchanges simply because they had more opportunities. The literature on self-disclosure suggests another plausible explanation for the finding. As Tubbs and Moss (1983) noted, self-disclosure occurs far more often during dyadic communication than during any other type of communication. Thus, the finding may be related to the level of intimacy that is characteristic of dyads.

CONCLUSIONS

The results indicate that the principals in this study used organizational and self-descriptions more frequently and for more time than they used other types of verbal self-presentational behaviors. The other findings that appear to be consistent with both the empirical and the theoretical literatures are that (1) superiors are the preferred targets for verbal self-presentation, (2) apologies appear more frequently with familiar audiences than with unfamiliar audiences, (3) organizational and self-descriptions are used more frequently in dyadic than in group situations, and (4) both organizational and self-descriptions are more prevalent when principals interact with external audiences than with internal audiences.

Together those findings suggest that audience characteristics influence the impression management behaviors of principals. Several questions and future directions appear important and relevant. First is the question of generalizability. As noted in the Methods section, several studies have identified similarities in the observed behaviors of principals and other types of managers (Martinko & Gardner, 1984b; Morris et al., 1981). Moreover, many of our predictions regarding impression management behavior, which originated in the general psychology and management literatures, appear to be valid indications of the behavior of the principals in this study. In addition, it is apparent that Mintzberg's (1973) role theory, originally developed by studying a more general group of managers (five CEOs), is also applicable to explaining the behavior of principals. Thus, there is at least some support for applying the findings of this study to a general population of managers. Obviously, however, obtaining additional comparative data is desirable.

A second concern pertains to the effectiveness and the impact of impression management behaviors. Since we took particular care to evaluate the performance levels of the subjects to ensure that all were effective principals, it seems reasonable to assume that the behaviors and relationships described by this study are characteristic of effective principals. However, because we did not explicitly investigate the influence of impression management on performance, and the study was primarily exploratory in nature, we examined only general relationships between impression management behaviors and the independent variables. The findings, which identify several relationships between impression management behaviors and audience characteristics like status and familiarity, suggest that those behaviors are purposive and must have some effect on the various types of audiences. Future work in this area not only should investigate the relationship between the subjects' behaviors and the audience but also should include some measure of the effects of managers' impression management behaviors on subordinates' reactions and performance.

In summary, this study contributes to our understanding of impression management behavior in several respects. First, it is the first direct observation study that demonstrates that self-presentational behaviors vary systematically with audience characteristics. Second, the results establish the general nature and parameters of these relationships, suggesting, for example, that the nature of descriptive statements used during interactions with high status and external audiences would be a particularly productive area for investigation. Finally, the study provides a methodology and basic set of coding procedures that we hope will facilitate the development of a more detailed and refined understanding of impression management.

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APPENDIX

Categories of Verbal Self-Presentational Behaviors

Self-descriptions. Whenever a principal describes his or her traits, skills, abilities, behavior patterns, feelings, opinions, style of management, personal life, or background, this category is applicable. Self-descriptions are reflective narrations of what the principal is like as a person. They are typically expressed in the first person singular. Examples: "I really have a temper," "I like to tour the halls every morning to see what's going on."

Organizational descriptions. This category is applicable whenever a principal describes: (1) the characteristics, activities, philosophy, history, future, etc., of the school, or some aspect of the larger school system with which he or she is intimately associated; (2) the professionally relevant traits, backgrounds, roles, and contributions of staff members; (3) the abilities, skills, activities, behaviors, or performance of students; (4) the immediate geographic, physical, socioeconomic, or political/legal environment of the school. Organizational descriptions are reflective narrations that are frequently phrased in the first person plural. Examples: "Our school has a mediocre sports program," "That teacher is great with our students."

Accounts. The accounts category is applicable whenever the following criteria are met: (1) a problem or situation that is potentially embarrassing for a principal or for other school members arises; (2) the principal makes remarks that clearly indicate that he or she recognizes that a predicament exists; (3) the principal offers an explanation of the event that reduces its negative implications for himself or herself for the school; (4) the principal offers the explanation to an audience that may potentially be critical of the principal as a consequence of the predicament.

In an account, a principal may deny an event occurred, deny causality, offer an excuse of extenuating circumstances or unforeseen consequences, downplay the severity of the predicament, justify it through comparison to others, or justify it through references to higher goals. Examples: "That teacher didn't realize paddling Johnny would get her in so much trouble," "I've had to lay off some people because our funds were cut."

Entitlements/enhancements. This category is applicable whenever a principal (1) favorably describes himself or herself; (2) favorably describes other people, entities, or events while making statements or comments that associate or link that referent to himself or herself or to the school or system; or (3) takes credit for a favorable outcome. Examples: "I hired Mrs. Jaccoby, and she's turned out to be an excellent teacher," "Our fifth grade math teacher was a finalist for the state Teacher of the Year Award."

Apologies. "Apologies are designed to convince the audience that the undesirable event should not be considered a fair representation of what the actor is 'really like' as a person" (Schlenker, 1980: 154). When apologizing, a principal admits being responsible for an undesirable event, but also tries to reduce the negative repercussions. Because principals are responsible for other school members, they sometimes have to apologize for their behaviors. Examples: "I'm sorry, I didn't mean to hurt your son's feelings. I am usually more careful than that," "I apologize for that teacher. He's usually more considerate."

Flattery. Whenever the principal "butters up" another person by complimenting them about their appearance, abilities, attributes, performance, etc., this category is applicable. To code flattery, the following rules were employed: (1) all non-task related compliments are coded as flattery; (2) task-related compliments are not coded as flattery unless they are accompanied by two or more positive qualifiers, such as "good," "very," "excellent," "fantastic," etc. Example: "Mr. Anderson, you did a wonderful job with the science fair. It was just super. You're a real science wizard!"

Favors. Whenever a principal offers to help someone or does something nice for them that is not normally prescribed by the job, this category is applicable. Example: "Miss Pitner, you can take a day off next week, if you'd like."

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DIRECTORS' CHARACTERISTICS AND COMMITTEE MEMBERSHIP: AN INVESTIGATION OF TYPE, OCCUPATION, TENURE, AND GENDER

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This study examined the composition of corporate board committees. The characteristics of occupation, type, tenure, and gender are examined in relationship to directors' membership on the four board committees that are typically the most influential and powerful—the audit, nominating, compensation, and executive committees. The results show strong evidence to suggest that the composition of these committees does differ in rather significant ways from that of corporate boards in general. There is also evidence that certain directorial characteristics take on more or less importance within particular groups.

Research concerning the composition and structure of corporate boards of directors has increased dramatically in recent years (e.g., Baysinger & Zeithaml, 1986; Chaganti, Mahajan, & Sharma, 1985; Kesner, Victor, & Lamont, 1986; Kohls, 1985; Mattar & Ball, 1985; Norburn, 1986, Vance, 1983). Yet, despite this increased attention, there is still one area about which we know very little—the composition of board committees.

Although most board decisions are made within the confines of smaller groups or committees, researchers tend to focus on the characteristics and composition of entire boards. This approach may actually distort perceptions of corporate boards, their functions, and the roles of directors. Investigators might, for instance, conclude that a board with six inside members and six outside members is balanced and that therefore the skills brought by each type of director are effectively matched. Yet, extending this example further, a disproportionately small number of outside members on key committees may have a negative effect on stockholder representation. Conversely, an inadequate number of insiders serving on those committees may in turn affect the representation of management and lower-level employees. If much board decision making takes place within the confines of committees, researchers should extend their research efforts to include that level.

This study examined committee composition. The directorial characteristics of occupation, type, tenure, and gender are considered in order to determine if certain patterns emerge within and across various subgroups.

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BOARD COMMITTEES

Although corporate boards frequently meet as bodies to discuss key issues and vote on various matters, most decision making takes place in smaller groups or committees (Bacon & Brown, 1973; Securities and Exchange Commission, 1980). According to many analysts, a committee approach has numerous advantages (Andrews, 1978; Bacon & Brown, 1973; Braiotta & Sommer, 1987; Brown, 1976; Securities and Exchange Commission, 1980; Waldo, 1985). Specialization by members, for example, leads to greater efficiency, expediency, and flexibility. Also, use of committees may lead to greater input from and objectivity among members.

These benefits have led to two dramatic changes in the use of such groups. First, the number of committees per board has increased significantly in recent years (Braiotta & Sommer, 1987; Heidrick & Struggles, Inc., 1971, 1977, 1978a, 1979a, 1983, 1986; Korn/Ferry International, 1982, 1983, 1987; Waldo, 1985). Although in the early 1970s firms typically maintained only one or two permanent committees, a 1981 survey by the National Association of Corporate Directors (NACD) indicated that this number had risen to an average of 4.3 for *Fortune* 1,000 companies, with 70 percent of those firms maintaining between three and five committees. In addition to this upward shift, there has also been an increase in the number of types of committees. In the survey just noted, for example, respondents wrote in the names of 128 groups not among the 12 formally listed on the questionnaire (National Association of Corporate Directors, 1982).

As might be expected, the charter and influence of each committee differs substantially from one company to another. Nevertheless, four types are commonly found in organizations and are frequently cited as having the greatest influence on corporate activities: the audit, nominating, compensation, and executive committees (Braiotta & Sommer, 1987; Korn/Ferry International, 1987; Securities and Exchange Commission, 1980; Vance, 1983; Waldo, 1985). In a recent survey of the *Fortune* 1,000 companies (Heidrick & Struggles, Inc., 1986), 99.2 percent of the responding firms had audit committees; 99.6 percent had compensation committees; 89.9 percent had nominating committees; and 93.8 percent had executive committees. Still other studies report similar levels across large firms (Bacon & Brown, 1973; Committee on Corporate Laws, 1976; Korn/Ferry International, 1987; National Association of Corporate Directors, 1982; Securities and Exchange Commission, 1980; Vance, 1983; Waldo, 1985).

The frequency of these groups' occurrence is not, however, the only reason for considering them the most important and influential committees. A review of their specific duties and functions indicates that they play a major role in the protection of stockholders' interests (see Appendix A). The Securities and Exchange Commission (SEC) considers these subgroups an important tool for monitoring corporate activities and requires companies to report the groups used and their memberships. Similarly, the major stock exchanges also have recommendations and regulations regarding the use and composition of these committees.

In sum, four board committees stand out as the most important from the perspectives of both firms and various regulatory agencies. Moreover, members of these groups tend to hold the greatest power and influence over corporate affairs. It is important, therefore, to examine the composition of these subgroups and the characteristics of their members.

DIRECTORS' CHARACTERISTICS AND COMMITTEE MEMBERSHIP

Type of Director

Perhaps the most widely researched composition variable is directorial type. Directors are typically grouped into two categories: insiders and outsiders. Inside directors are current or former employees of a company. They typically hold or have held high-level executive positions and thus offer the board an in-depth working knowledge of the organization.

Although a board can expect a firm's chief executive officer (CEO) to provide specialized knowledge and experience, there might be situations in which CEOs exclude key information either purposefully or accidentally. In the first case, CEOs, who are evaluated on the basis of their firms' overall performance, may be tempted to present the best possible picture, glossing over negative aspects and giving outside directors a false impression. In the second case, CEOs might misrepresent certain aspects of their firms' performance simply because they are unable to be fully informed about every area of the company. In these situations, insiders can help insure the accuracy of information presented and serve as an important communications link between management and other board members.

In contrast, outside members are valued because of their breadth of experience and knowledge, their contacts outside a firm, and their independence from the CEO and other top executives. Outsiders typically bring a broader range of experience because of their contact with different companies and industries and their interaction with other management teams (Mace, 1971; Securities and Exchange Commission, 1980; Vance, 1983; Waldo, 1985; Williams & Shapiro, 1979). From a resource dependence perspective, outsiders often help an organization secure scarce resources through their external associations (Pfeffer, 1972; Pfeffer & Salancik, 1978). Moreover, because of their relatively greater independence, outsiders are better able to insure that the proper checks and balances are maintained (Anshen, 1980; Mace, 1971; Vance, 1983; Waldo, 1985; Williams & Shapiro, 1979) than insiders are. Researchers have often suggested that the element of control is particularly important for two reasons: in most large companies, the CEO is also chairman of the board (Berg & Smith, 1978; Heidrick & Struggles, Inc., 1986; National Association of Corporate Directors, 1982), and inside directors work for the CEO on a daily basis (Securities and Exchange Commission, 1980; Williams & Shapiro, 1979).

The combination of those two points has led many critics to charge that a conflict of interests exists in most boards (*Fortune*, 1984; Williams & Shapiro, 1979). Questions often arise as to whether inside directors, and CEOs in particular, can properly perform their function of monitoring top management performance, given that they are monitoring themselves. This point also highlights why composition is such a critical issue with regard to board committees. Too many insiders on an audit, compensation, or nominating committee, for example, might cause problems of independence in terms of internal monitoring, setting top executive compensation, or nominating new board members.

Thus, various regulatory agencies—the SEC, the New York Stock Exchange (NYSE), the American Stock Exchange (ASE), the National Association of Securities Dealers (NASD), and the NACD—offer specific guidelines concerning the composition of these key committees. The NACD, for instance, suggests that all four key groups maintain a majority of outside, unaffiliated members to insure independent judgment and fairness. In addition, the NYSE requires that all companies listed on the exchange have an audit committee composed entirely of independent, outside members. Although it is stated as a recommendation rather than a requirement, the ASE maintains a similar position. In light of these recommendations, directorial type is likely to influence committee membership.

> *Hypothesis 1: There will be disproportionately more outside than inside directors on the major board committees.*[1]

Directors' Occupations

A second directorial characteristic often investigated by researchers is occupation (Bacon & Brown, 1973; Heidrick & Struggles, Inc., 1981; Korn/Ferry International, 1983; Vance, 1983). In a survey of the nation's 1,300 largest firms, Heidrick & Struggles, Inc. (1981) found that most directors (64.9%) were business executives. Of the remaining occupations represented, 6.0 percent of the directors were attorneys, 8.9 percent were teachers or educational administrators, and 4.5 percent were consultants. This report is consistent with the findings of other studies that have indicated a tendency for boards to select directors with business experience (Bacon & Brown, 1973; Korn/Ferry International, 1987; Vance, 1983). Furthermore, occupation is likely to have an even greater influence in the case of major committee memberships; service on an audit committee, for instance, might require members to have a strong working knowledge of business concepts and practices. Thus,

> *Hypothesis 2: There will be disproportionately more business executives than individuals with nonbusiness occupations on the major board committees.*

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[1] The term "disproportionate" is used due to the skewed nature of the independent variables. In the case of directorial type, for example, the average split for the full board between insiders and outsiders is 37 percent versus 63 percent. Thus, the hypothesis proposes that the observed percentage of outsiders will be significantly greater than the expected 63 percent.

Directors' Tenure

Still a third important characteristic that may distinguish major committee members from nonmembers is tenure, the length of time a member has served on a board. Previous researchers have argued that it takes at least three to five years for directors to gain an adequate understanding of a firm and the way it operates (Bacon & Brown, 1973), and many have insisted that a more thorough understanding of firm takes much longer. If tenure is an important factor for directors in general, it takes on even more importance in the context of committee assignments, where strong experience in solving company problems is likely to be a highly valued characteristic.

> *Hypothesis 3: There will be disproportionately more directors with long tenure than with short tenure on the major board committees.*

Directors' Gender

A final directorial characteristic of interest to many researchers is gender. In particular, studies of female board members have increased dramatically in recent years (Elgart, 1983; Harrigan, 1981; Heidrick & Struggles, Inc., 1978b; Orr, 1977; Schwartz, 1980; Stultz, 1979; *Wall Street Journal*, 1986). And, although most reports indicate that the number of female directors is increasing (Elgart, 1983; Heidrick & Struggles, Inc., 1978b, 1986; Herman, 1981; Schwartz, 1980; Vance, 1983), there is little agreement as to what this trend represents. Some researchers have expressed optimism, suggesting that the increase signals a transition in women's roles as top executives (Cooney, 1978; Spencer, 1984). Others, however, have been less enthusiastic, noting that although the actual number of female directors is increasing, their overall percentage remains very small (Elgart, 1983; Heidrick & Struggles, Inc., 1978b; Schwartz, 1980; Stultz, 1979; *Wall Street Journal*, 1986). Finally, some studies have even indicated that fewer U.S. companies had women on their boards in 1986 than in the recent past (Korn/Ferry International, 1987; *Wall Street Journal*, 1987).[2]

Catalyst, a nonprofit agency specializing in women's job issues, reported that only 367 women sit on the boards of the country's top 1,300 public companies, compared to 15,500 men (*Business Week*, 1984). According to the *Wall Street Journal*:

> Women aren't the anomaly in the corporate board room they were just a decade ago, when only 13% of the 1,350 major U.S. corporations had a female director. Last year, that figure for top companies jumped to 41%.
>
> Still . . . [women] hold only 3% to 4% of *Fortune* 1,000 directorships despite their majority place in the workforce (1986: 29D).

A recent Korn/Ferry International study suggested that "the number of women board members may have peaked" (*Business Week*, 1984: 126), and a 1984 article in the *Wall Street Journal* expressed pessimism in an even more blunt fashion:

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[2] The percentage of large U.S. companies with woman board members was 53 percent in 1984 but only 51 percent in 1985 and 1986 (*Wall Street Journal*, 1987).

> The board of directors is composed of all older males. They still think of women as a piece of fluff with no depth (1984: 35).

If that is true, and firms put women on corporate boards merely for the sake of firm image, without concern for women's potential contributions, it is unlikely they would be asked to serve on a board's most powerful and influential committees (Stultz, 1979). A fourth hypothesis is proposed to examine whether or not this type of tokenism exists:

> *Hypothesis 4: There will be disproportionately fewer women than men serving on the major board committees.*

Although Hypothesis 4 provided a useful means to examine women's roles on corporate boards, the results must be interpreted carefully. Differences in the predicted direction might lead to the conclusion that directors who are women are not given responsibilities and duties equal to their counterparts, who are men; yet that conclusion would be premature at best and erroneous at worst. It is possible that female directors differ from males in terms of type, tenure, and occupation, and that it is those differences, not gender, that would account for disproportionately lower membership on key committees.

We can speculate, for example, that because women are often concentrated in the lower half of the corporate pyramid, few have risen high enough in their organizations to qualify for service as inside directors. Harrigan's (1981) finding that the ratio of women to total managers is positively correlated with the probability of a firm electing at least one woman director appears to strengthen that argument. It is important, therefore, to consider a possible relationship between gender and directorial type:

> *Hypothesis 5: Female directors are less likely to be insiders than their counterparts who are men.*

In a similar vein, it is likely that occupation and gender are related as well. According to Harrigan (1981), in the late 1970s women had earned relatively few executive positions within U.S. corporations; therefore, female directors typically came out of law, education, or nonprofit organizations rather than from within corporate ranks. Stultz agreed, noting that "unlike male directors, . . . women's careers are more diverse and less business-oriented" (1979: 10), and a recent Korn/Ferry International (1987) study supported the positions of both authors.

> *Hypothesis 6: Female directors are less likely to come from business occupations than their counterparts who are men.*

Finally, the same basic arguments used in the above two cases can apply to the issue of tenure:

> *Hypothesis 7: Female directors have served on their boards fewer years than their counterparts who are men.*

RESEARCH METHODS

Sample

The sample used in this study consisted of 250 *Fortune* 500 companies from the year 1983. The firms, which were randomly selected, represented some 27 different industries, ranging from pharmaceuticals to farm and industrial equipment. Annual sales ranged from a low of $419 million to a high of $88.6 billion ($\bar{x}$ = $3.5 billion), and assets extended from $123 million to $63 billion ($\bar{x}$ = $2.8 billion).

Variables

All information concerning board members and committee assignments was obtained from proxy statements filed with the SEC. Among the information collected was name, gender, age, occupation, number of years on the board, type, and committee memberships. I used a binary classification to code gender, type, and committee membership. Committee names were condensed into a list of 36 groups, and board members were coded either 1 or 0 to reflect membership in a group. I used 15 separate categories to identify directors' occupations; however, to test Hypotheses 2 and 5, I later condensed the categories into a binary classification of business-nonbusiness. Finally, the remaining variables, age and tenure, were measured on interval scales.

Data Analysis

Because the data were categorical, chi-square analysis was used in the initial tests of the hypotheses, and hierarchical log-linear modeling was used in follow-up analyses. Although less often used than chi-squares, hierarchical log linear analysis was particularly appropriate in this instance because the observations were not from normally distributed populations with constant variance. Moreover, this technique provides a means of examining interactions among categorical variables (see Appendix B).

Use of this technique begins with model formulation. Because many different models can be derived for a given set of variables, it is important to choose the most appropriate one, using three basic criteria. First, the best-fit model can be described as having expected values that are not significantly different from observed values, as indicated by a small goodness-of-fit statistic. Second, the model selected should be "substantively interpretable and as simple (parsimonious) as possible" (Norusis, 1986: B192). Third, no other models should fit the data better than the best model.

As in regression analysis, one way to arrive at such a model is to use backward elimination. This procedure starts with all effects and then removes those that do not make a significant contribution. Yet, an investigator can arrive at the same model by subtracting the likelihood-ratio chi-squares of two competing models to see if the difference is significant (Knoke & Burke, 1982; Norusis, 1986; Smith, White, & Looney, 1986). In this second case, the models would differ only in terms of the presence of the effect to be tested. The partial chi-square values, or the difference between the two likelihood-ratio chi-squares, is used to test the hypothesis that the effect is zero (Knoke & Burke, 1982; Norusis, 1986). In a final step, if each parameter estimate derived from this best model is multiplied by 2, regression-like coefficients are obtained. Odds can then be calculated by taking the antilog of these new values.

RESULTS

The 250 sample companies in this study averaged approximately 13 members per board, for a total of 3,128 directors. Of those individuals, 113 members were women (3.6%) and 3,015 were men (96.4%)—proportions consistent with the findings of previous studies (Elgart, 1983; Heidrick & Struggles, Inc., 1978a, 1979a, 1981). Also consistent with prior research was the inside-outside composition of the sample (Heidrick & Struggles, Inc., 1979b, 1981; Korn/Ferry International, 1981; National Association of Corporate Directors, 1982; Vance, 1983). Outsiders accounted for approximately 63 percent of the directorships, and insiders represented 37 percent of the positions.

In terms of members' occupations, 65 percent of the board positions were held by business executives, 4.7 percent of the directors were attorneys, 6.1 percent were consultants, and 5.3 percent were associated with educational institutions. Once again, the figures are consistent with prior work in the area (Clendenin, 1972; Elgart, 1983; Heidrick & Struggles, Inc., 1981; Securities and Exchange Commission, 1980). On average, the board members in the sample had been serving in their positions as directors for 11 years, and they were simultaneously serving on the boards of two other firms. Finally, the average age of board members was 59 years.

To test Hypotheses 1 through 4, it was necessary to distinguish between major and minor committees. As previously discussed, I identified the audit, nominating, compensation, and executive committees as the most powerful and influential groups. I then used chi-square analysis to determine whether there was disproportionate representation based on the directorial characteristics identified in the first four hypotheses. As Table 1 indicates, when all the important committees are considered as a group, significant differences emerge for occupations ($\chi^2 = 84.37$; $p < .001$), type ($\chi^2 = 259.28$; $p < .001$), and tenure ($\chi^2 = 137.96$; $p < .001$). Thus, the results provide strong evidence that members of these important committees are more likely to be outsiders, come from business occupations, and have longer tenure than nonmembers. Moreover, when each committee is considered individually, the results remain the same.

Contrary to the findings for Hypotheses 1 through 3, the results for Hypothesis 4 indicate no significant difference; gender does not appear to be a characteristic that distinguishes committee members from nonmembers. Examining committees separately, however, reveals that women do serve less often than men in two cases—the nominating and executive committees.

TABLE 1
Differences in Committee Membership by Directorial Characteristics[a]

	Occupation			Type			Tenure in Years				Gender		
Committee Membership	Business	Nonbusiness	χ^2	Insider	Outsider	χ^2	0–5	6–10	>10	χ^2	Men	Women	χ^2
All important committees													
Nonmember	724	222	84.37***	543	399	259.28***	419	217	306	137.96***	912	35	0.03
Member	1,297	884		594	1,575		510	664	994		2,103	78	
Audit committee													
Nonmember	620	475	129.62***	1,076	1,060	578.13***[b]	647	557	932	15.81***	1,002	58	0.01
Member	1,527	473		48	894		270	310	361		846	48	
Nominating committee													
Nonmember	808	382	29.86***	500	679	62.83***	445	325	410	65.54***	1,135	55	3.90**
Member	326	270		137	453		111	204	275		580	16	
Compensation committee													
Nonmember	1,343	607	64.05***	917	1,020	336.02***	643	523	770	35.88***	1,873	77	0.60
Member	477	417		104	786		197	284	409		864	30	
Executive committee													
Nonmember	810	507	24.65***	326	981	199.75***	537	376	394	191.81***	1,245	72	31.71***
Member	611	239		464	379		138	224	481		843	7	

[a] Ns vary depending on whether a given company has the committee listed.

[b] When interpreting this finding, one should take into consideration that most sample companies are listed on the NYSE and as such are required to have 100 percent outsiders on their audit committee.

** $p < .01$

*** $p < .001$

In the cases of the audit and compensation committees, women are proportionately represented.

Although an initial look at these results suggests gender differences in some committee assignments, further tests are needed to insure that gender is, in fact, the underlying issue. It is possible that the other factors examined in this study covary with gender and are actually responsible for the observed differences. Chi-square statistics help to provide a partial answer to this question.

Hypothesis 5 suggested that female directors come from outside the organizations they are serving more often than their male counterparts, and the results do indicate a significant gender difference in the case of directorial type (see Table 2). Caution must be taken, however, when interpreting this finding. There were only six female insiders out of the entire sample of 3,128 directors. That number is simply too small to insure the accuracy of the test and the drawing of firm conclusions from the results. The tests of the two remaining hypotheses, Hypothesis 6 and Hypothesis 7, however, do indicate strong differences between female and male directors. Women are less likely to have business occupations, and their tenure is significantly less than that of their counterparts who are men.

Although chi-square statistics provide an accurate picture of whether certain types of directors are disproportionately represented on major committees and whether women and men who are board members differ significantly in terms of various characteristics, this type of analysis cannot be used to create an overall model nor to test interactions between variables. Thus, I used hierarchical log-linear modeling in follow-up analyses.

In the initial stages of model formulation, a fully saturated model was identified, one that included all main effects and interaction terms. I then did tests to identify whether effects of various orders were significant. As Table 3 indicates, for all four committees, fifth- and fourth-order effects were not significant. Thus, models with first-, second-, and third-order effects adequately represented the data.

TABLE 2
Directorial Characteristics and Committee Assignments by Gender

Characteristics	Men	Women	χ^2	p
Occupation				
Business	1,024	31	71.01	< .001
Nonbusiness	1,991	82		
Type				
Insider	1,131	6	48.74	< .001
Outsider	1,868	106		
Tenure				
0–5 years	877	52	43.63	< .001
6–10 years	834	47		
> 10 years	1,287	13		

TABLE 3
Tests of Order Effects[a]

	Audit Committee		Nominating Committee		Executive Committee		Compensation Committee	
K	*df*	χ^2	*df*	χ^2	*df*	χ^2	*df*	χ^2
5	0	0.00	0	0.00	0	0.00	0	0.00
4	11	14.29	3	4.04	3	4.55	5	2.98
3	16	133.56***	24	56.81***	24	44.79**	22	98.22***
2	14	1,445.89***	14	633.89***	14	927.29***	14	1,143.26***
1	6	4,374.87***	6	2,355.61***	6	2,830.16***	6	3,942.93***

[a] The tests of the hypotheses that the kth-order term is zero is based on: $\chi^2 = \chi^2_{k-1} - \chi^2_k$ where χ^2_k is the value for the model that includes the kth-order effect and χ^2_{k-1} is the chi-squared value for the model without the kth-order effect. Thus, this table presents the results of tests designed to determine whether terms of a particular (i.e., K) order are zero. Small observed significance levels indicate that the hypothesis that terms of a particular order are zero should be rejected.

* $p < .05$

** $p < .01$

*** $p < .001$

Next, partial chi-square values were used to identify the contributions of individual terms. Table 4 provides a list of some of those terms. For purposes of interpreting the results, significant chi-square values indicate that a particular main effect, interaction term, or both contribute significantly to the model. So, for example, in the case of the executive committee, the main effects of type, occupation, tenure, and gender and the interaction term occupation by type significantly contribute to the best-fit model. In the case of the compensation committee, the same effects are significant, with the exception of occupation. Thus, in this instance, occupation only appears to make a significant contribution to the best model when it is entered as an interaction term with type.

After using these partial chi-square values to properly identify the best-fit model for each committee, parameter estimates were examined and regression-like coefficients were obtained by multiplying the estimates by 2. I then translated these new values into odds by taking the antilogs (Norusis, 1983). Table 5 shows the coefficients and the antilogs for some of the key terms in the four models. In the case of membership by gender, for instance, the antilog indicates that other things being equal, the odds of a female director serving on an audit committee are 1.78 to 1, and the odds for men are only 0.56 to 1. In fact, the odds of a female director serving as a member on three of the four major committees (the audit, nominating, and compensation committees) are greater than 1. These values indicate that if, for example, Director Smith is a woman, the odds are much higher that she will be a member of one of these three key committees than if Director Smith is a man. The antilogs represent relative odds ratios (Knoke & Burke, 1982), however, and do not mean that more women serve on these committees than men.

TABLE 4
Partial Chi-Squares: Effect of Interactions on Committee Membership

		Audit Committee	Nominating Committee	Compensation Committee	Executive Committee
Name of Effect[a]	*df*	Partial χ^2	Partial χ^2	Partial χ^2	Partial χ^2
Membership × type	1	575.71***	9.04***	368.04***	110.51***
Membership × occupation	1	9.80**	2.62	0.26	5.44*
Membership × tenure	2	8.17*	77.19***	68.84***	154.60***
Membership × gender	1	0.05	6.39*	6.66**	9.34**
Membership × gender × tenure	2	3.50	0.91	0.94	2.55
Membership × gender × occupation	1	0.32	0.58	0.48	0.21
Membership × tenure × occupation	2	2.42	1.52	3.04	0.55
Membership × gender × type	1	0.78	0.15	0.54	1.61
Membership × tenure × type	2	2.80	8.32*	0.84	0.24
Membership × occupation × type	1	65.26***	8.39**	34.46***	6.88**

[a] Although the convention is to state the effect as membership by type (Norusis, 1983: 544, 551), membership by type, occupation, tenure, and gender are actually effects of directorial type. The remaining terms represent two-way interactions.

$* \; p < .05$

$** \; p < .01$

$*** \; p < .001$

To further illustrate the interpretation of antilogs, it is helpful to consider the variable tenure. The values in this case indicate that in three cases, the nominating, executive, and compensation committees, the odds are greater that a senior director will serve as a member of a committee than a junior director. Only in the case of the audit committee are the odds greater for board members with less tenure. Again, these are relative odds. In absolute terms, there are still more senior directors serving on major committees because the number of such directors on boards as a whole is much larger.

DISCUSSION AND CONCLUSIONS

The results of this study offer some important insights regarding the composition of key board committees. Although much of the prior work in the area has dealt with boards as a whole, research at this higher level may not adequately capture the effects of various directorial characteristics on decision making activities.

In this study, the directorial characteristics of occupation, type, tenure, and gender were examined in relationship to membership on the four most

TABLE 5
Parameter Estimates and Antilogs[a]

Name of Effect	Audit Committee Parameter Estimate × 2	Audit Committee Antilog	Nominating Committee Parameter Estimate × 2	Nominating Committee Antilog	Compensation Committee Parameter Estimate × 2	Compensation Committee Antilog	Executive Committee Parameter Estimate × 2	Executive Committee Antilog
Membership[b]	–.9656	0.3808	–.7372	0.4784	–.7370	0.4785	–.8631	0.4218
Membership by type[c]								
Outsider	.7278	2.0705	–.0141	0.9860	–.7525	0.4712	.3055	1.3573
Insider	–.7278	0.4830	.0141	1.0142	.7525	2.1223	–.3055	0.7368
Membership by occupation								
Nonbusiness	.5144	1.6726	.2327	1.2620	–.2612	0.7701	.2330	1.2624
Business	–.5144	0.5979	–.2327	0.7924	.2612	1.2985	–.2330	0.7922
Membership by tenure								
0–5 years	.2288	1.2571	–.2812	0.7549	–.6139	0.5412	–.1365	0.8724
6–10 years	–.0427	0.9582	–.1517	0.8592	.1456	1.1567	.0277	1.0281
> 10 years	–.1861	0.8302	.4329	1.5417	.4683	1.5973	.1088	1.1149
Membership by gender								
Men	–.5751	0.5626	–.0555	0.9460	.1996	1.2209	–.2072	0.8129
Women	.5751	1.7773	.0555	1.0571	–.1996	0.8191	.2072	1.2302

[a] For further elaboration concerning the interpretation of parameter estimates and antilogs see Norusis (1983).

[b] This value is the mean of the overall effect.

[c] Although the convention is to state the effect as membership by type (Norusis, 1983: 544, 551), this term is actually the effect of director type, and the same is true in the cases of occupation, tenure, and gender. Not displayed in this table are the parameter estimates and antilogs for specific interaction terms identified in the final models. Given the nature and number of these terms, the list is quite long and varies from one committee to another. A separate table with these values can be obtained directly from the author.

influential and powerful board committees, the audit, nominating, compensation, and executive committees. The results show strong evidence to suggest that the composition of those committees does differ in rather significant ways from that of corporate boards in general. Moreover, there is evidence that certain directorial characteristics take on more or less importance within particular groups.

The members of all four key committees are more likely to be outsiders,[3] to come from business occupations, and to have long tenure as directors. It is important to note, however, that even directors without those characteristics are quite likely to serve as members of one of the four committees. For nonbusiness board members, for example, the odds are greater than 1 of their being asked to serve on an audit, nominating, or executive committee.

In the case of gender, the results indicate significant differences in only two instances, the nominating and executive committees. In many respects, gender differs from the other three in terms of an expectation that differences should exist. For the variable type, for example, significant differences seemed likely since regulatory agencies like the SEC and the stock exchanges require, or recommend, that members of important committees come from outside an organization. With regard to occupation and tenure, although regulatory agencies have not expressed a position either way, researchers and practitioners in general agree that extensive experience and familiarity with business and long tenure better equip individuals to assist in the complicated and involved proceedings of these committees. Once again, it is not surprising that significant differences exist. Moreover, as long as some degree of diversity is present among members, so that differing viewpoints are aired and considered, the observed differences may actually serve to strengthen a board.

In the case of gender, however, the reason for expected differences has more to do with women's progress up the corporate pyramid than with their potential contributions (*Wall Street Journal*, 1987). Although it can be argued that observed differences in type, tenure, and occupation may actually enhance a board, it is doubtful that the same argument applies to the variable gender. It is unlikely that society would strive to reduce all differences with regard to the first three variables, but minimization of gender differences may be an area worth future consideration.

To some, the results might suggest a type of tokenism in which women are invited onto corporate boards merely for show, without consideration of their potential contributions. Yet, in the case of two key committees, the results indicated that women are proportionally represented. Follow-up analyses also tended to support arguments that tokenism is not the underlying issue. First, there is some evidence to suggest that existing gender differences may actually be a function of the other factors under investigation. Female directors differ significantly in that they tend to come from outside organizations, to hold nonbusiness positions, and to have shorter tenure than their male counterparts. Furthermore, in an examination of partial chi-squares, which were used in formulating models of committee membership, gender appeared to contribute less than the variables tenure and type. Finally, with the exception of the compensation committee, examination of parameter estimates and antilogs indicated that the odds that women directors will serve as members of one of these groups are substantially higher than those for men.

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[3] One notable exception is the executive committee, on which insiders are more likely to serve. One of this group's main responsibilities is to assemble and handle major issues under emergency conditions when a full board cannot be assembled. It is understandable, therefore, that more closely connected people to a company would be invited to serve here. Moreover, the expressed sentiment of various regulatory agencies is that greater reliance on insiders in the case of this particular committee represents less of a conflict of interests than in other cases.

The findings of this study clearly indicated that women are not window dressing but do hold important positions on the boards of large corporations. According to Bacon and Brown (1977), this is likely to be welcome news to current and future woman directors who do not want to be symbols of corporate guilt but directors who happen to be women. And, although the findings are good news, it is important to remember that corporate America still has a long way to go before women are equally represented on boards. The sheer number of female directors and the rate of increase over time remains small, despite evidence at other levels of corporate structures that women can and do add much needed diversity (*Business Week*, 1987). Moreover, as was noted, some reports even indicate that in 1986 fewer U.S. companies had women as directors than had been the case in the recent past (Korn/Ferry International, 1987; *Wall Street Journal*, 1987). Perhaps it is time corporate managers and directors of regulatory agencies began to consider this point and to reexamine their policies concerning the nomination and selection of directors.

In general, the results of this study highlight an area that requires further consideration. Given that today's directors are more likely to be sued than ever before (*Business Week*, 1986; Jones, 1986; Vance, 1983; Waldo, 1985), their involvement in boardroom activities is expected to rise significantly. This increase is likely to be most evident in terms of the use and involvement of key corporate committees (Braiotta & Sommer, 1987). This study can only be considered a beginning, and it is important that in future studies of corporate boards, researchers continue to focus on the composition of key corporate committees.

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APPENDIX A

Common Functions of Board Committees

The numbers in brackets represent the percentage of companies with over $500 million in sales having the specified function.

Audit committee: (1) Setting the scope of corporate audits [60%], (2) reviewing completed audits with external auditors [60%], (3) determining the adequacy of internal controls [52%], (4) selecting internal auditors [48%], (5) reviewing completed audits with internal auditors [39%], (6) reviewing company accounting policies and procedures [34%], (7) determining the adequacy of internal controls [32%], (8) reviewing the completed audits with management [29%], (9) setting auditor's fees [21%].

Compensation committee: (1) Reviewing and making recommendations on compensation for senior management [72%], (2) administering stock option programs [31%], (3) setting compensation for senior management [28%].

Nominating committee: (1) Considering stockholder recommendations [100%], (2) selecting nominees for directors [41%], (3) evaluating incumbents [17%].

Executive committee:[a] (1) Serving as a stand-in to act in lieu of a full board when immediate actions are needed, (2) counseling the CEO on ideas and proposals prior to disclosure to the full board, (3) overseeing the activities of other board committees.

[a] Statistics concerning the use of these functions by firms are not available; firms are not required by the SEC to report common functions of this committee.

Source: National Association of Corporate Directors (1982). See also Braiotta and Sommer (1987).

APPENDIX B

Log-linear modeling is similar to multiple regression analysis; however, all variables used for classification are independent variables and the dependent variable is the number of cases in a cell of cross-tabulation (Norusis, 1986).

In general, the model for the log of the observed frequency of the *i*th row and the *j*th column is:

$$F_{ij} = \mu + \lambda_i^o + \lambda_j^t + \lambda_{ij}^{ot}$$

In this example, F_{ij} is the observed frequency in the cell; λ_i^o is the effect of the *i*th occupation category; λ_j^t is the effect of the *j*th tenure category; and λ_{ij}^{ot} is the interaction for the *i*th variable of the occupation category and the *j*th value of the tenure variable.

The lambda parameters and μ are estimated from the data with λ the average log of the frequencies in a particular category minus the grand mean, while μ is the average of the logs of the frequencies in all table cells. The interaction parameters indicate the difference between the sums of the effects of the variables taken individually and collectively (i.e., the additional effect associated with particular combinations of variables). Thus, the estimate for λ_{ij} is simply the difference between the log of the observed frequency in a particular cell and the log of the predicted frequency using only the lambda parameters for the row and column variables.

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ATTITUDES TOWARD RISK AND THE RISK-RETURN PARADOX: PROSPECT THEORY EXPLANATIONS

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This study attempted to explain Bowman's risk-return paradox in terms of recent research in behavioral decision theory and prospect theory. The research emphasized the role of reference, or target, return levels in analyzing risky choices. For returns below target, a large majority of individuals appear to be risk seeking; for returns above target, a large majority appear to be risk averse. Using extensive COMPUSTAT-based data on U.S. firms, we consistently found a negative risk-return association for firms having returns below target levels and a positive association for firms with returns above target. These results support the basic propositions of prospect theory and are extremely robust within and across industries and for all time periods studied.

The relationship between risk and return has received considerable attention from researchers in business administration, economics, and finance. Conventional economic wisdom (e.g., Brealey & Myers, 1981) suggests that risk and return are positively correlated.

Existing research studies, most of which are summarized in Table 1, have largely supported a positive risk-return association. However, Bowman (1980) discovered that within most industries, risk and return were negatively correlated. He described that research outcome as a paradox for strategic management, since the findings ran counter to the conventional wisdom that argued for a positive association. He also argued that firms' risk attitudes may influence risk-return profiles and that more troubled firms may take greater risks (Bowman, 1982, 1984).

This study attempted to explore the role of attitudes toward risk in the management of strategic risk and thus to enrich understanding of Bowman's risk-return paradox. Recent research in behavioral decision theory and prospect theory (Kahneman & Tversky, 1979; Laughhunn, Payne, & Crum, 1980) has suggested that individuals use target, or reference, points in evaluating risky choices. Further, individuals are not uniformly risk averse but adopt a mixture of risk-seeking and risk-averse behaviors. Indeed, the evidence (Kahneman & Tversky, 1979; Laughhunn et al., 1980; Mao, 1970; Siegel, 1957) suggests that when returns have been below target, most individuals are risk seeking and that when returns have been above target, most are risk averse.

From a research viewpoint, it is important to question whether the results of experiments on individuals' attitudes toward risk and risky choice behaviors (e.g., Kahneman & Tversky, 1979; Laughhunn et al., 1980) can be translated into the world of corporate organizational behavior. Bowman (1982) noted that the literatures of economics and political science have both offered models, commonly described as rational-actor models (Allison, 1971), advancing the proposition that organizations may act like individuals. Indeed, his research, based on content analyses of companies in three industries, confirmed the notion that companies' behaviors may be similar to those of individual decision makers. He found that troubled companies, like troubled individuals, take larger risks, thus supporting the adaptation of risky choice research to the context of corporate decision making.

Therefore, in this study we developed a research methodology to test the hypothesis that risk attitudes, conceptualized in terms of prospect theory's utility function, can explain the relationship between risk and return both across firms and within industries. We expected risk-seeking attitudes (a convex value function) below target, or reference point, return levels and risk-averse attitudes (a concave value function) above target return levels. That expectation leads in turn to a hypothesis of a U-shaped risk-return function (see Figure 1, curves 3 and 4) and the expectation of negative risk-return associations below target levels and positive risk-return associations above target levels.

THEORETICAL BACKGROUND AND LITERATURE REVIEW

Risk-Return Research

Table 1 summarizes some of the important studies that have examined risk-return patterns in different industry contexts. Positive risk-return relationships have commonly emerged in cross-sectional studies examining both industry-level and firm-level data, even where researchers controlled for the industry effect (Conrad & Plotkin, 1968; Cootner & Holland, 1970; Fisher & Hall, 1969; Hurdle, 1974). The relationship appears to hold regardless of firms' national identities (Neumann, Bobel, & Haid, 1979).

Negative risk-return relationships emerge when alternative measures are included in studies (Armour & Teece, 1978; Bowman, 1980, 1982, 1984; Treacy, 1980). Such measures range from the nature of the industry, the time period studied, firm size, diversification strategies, risk measures, and risk attitudes. For example, negative risk-return associations are more common when data are from the 1970s than the 1960s (see Table 1) and when measures are accounting-based rather than market-based (Fiegenbaum & Thomas, 1985, 1986). The evidence on diversification strategy and risk indicates that related diversification strategies exhibit negative risk-return associations (Bettis & Hall, 1982; Bettis & Mahajan, 1985), whereas unrelated strategies

TABLE 1
Risk-Return Association: Summary of Major Empirical Studies

Studies	Time Period	Samples	Intervening Variables	Risk-Return Associations
Conrad & Plotkin (1968)	1950–65	783 U.S. companies representing 59 industries	Industry effect	Significant positive association
Fisher & Hall (1969)	1950–64	11 U.S. industries	Industry effect	Significant positive association for both firm and industry level
Cootner & Holland (1970)	1946–60	315 U.S. companies representing 39 industries	Industry effect and time	Significant positive association for both firm and industry level; the industry relationship was consistent for each year
Hurdle (1974)	1960–69	228 U.S. firms representing 85 industries	Industry effect	Significant positive association for both firm and industry level
Armour & Teece (1978)	1955–73	28 U.S. firms from the petroleum industry	Time	Negative but not significant association
Neumann, Bobel, & Haid (1979)	1965–73	334 West German industrial stock companies	Firm size	Significant positive association for the whole sample; when the sample was divided into big and small companies, positive and negative association was found
Bowman (1980)	1968–76 1972–76	(a) 1,572 U.S. companies representing 85 industries (b) 11 industries	Industry effect	Significant negative association within industries; in addition, negative but not significant association across industries
Treacy (1980)	1966–75	1,458 U.S. companies representing 54 industries	Firm size	Significant negative association within and across industries
Bowman (1982)	1979	Food processing, computer, and container industries in U.S.	Troubled situations	Significant negative association within industries for troubled companies
Bettis (1981) Bettis & Hall (1982) Bettis & Mahajan (1985)	1973–77	80 U.S. companies	Diversification strategy and industry characteristics	Significant positive association for unrelated firms; significant negative association for related firms; no statistically significant association for related-linked firms

TABLE 1 (continued)

Studies	Time Period	Samples	Intervening Variables	Risk-Return Associations
Marsh & Swanson (1984)	1958–81	135 U.S. firms		No statistically significant association
Fiegenbaum & Thomas (1985)	1960–79	Ranges from 345 to 700 U.S. companies representing 7 industries	Time	Significant positive association in the 1970s; significant negative association for 1965–69.
Fiegenbaum & Thomas (1986)	1960–79	Ranges from 1,283 to 2,394 U.S. companies representing 37 to 56 industries, respectively	Time and risk measurement	Significant negative association for accounting measures of risk in the 1970s; significant positive association for accounting measures of risk in the 1960s; no statistical significance for market risk measure

exhibit positive risk-return associations. Finally, risk attitudes also appear to influence troubled firms to seek greater risks (Bowman, 1982), thus leading to an observed negative risk-return association.

Behavioral Decision Theory and Risk Taking

Most of the literature dealing with risky choice behavior assumes that decision makers are risk averse. That assumption is a basic premise of much research in business, finance, economics, and management science. In terms of utility theory, the assumption implies that a decision maker has a utility function that is uniformly concave or that individuals depart from risk-averse behavior only under unusual circumstances. Many researchers (Friedman & Savage, 1948; Grayson, 1959; Markowitz, 1952; Swalm, 1966) have questioned the assumption of global risk aversion on both theoretical and empirical grounds.

Recent advances in behavioral decision theory (Fishburn, 1977; Fishburn & Kochenberger, 1979; Kahneman & Tversky, 1979; Laughhunn, Payne, & Crum, 1980) have emphasized the role of reference, or target, levels in the analysis of risky choices. Current evidence (summarized in Table 2) reveals that most individuals exhibit a mixture of risk-seeking and risk-averse behavior, with the range of the returns where those two risk preferences are the predominant modes of behavior being intimately connected with the notion of a target return. For returns below target, most individuals appear to be risk seeking; for returns above target, a large majority appear to be risk averse, which is consistent with one of the main predictions of prospect theory (Kahneman & Tversky, 1979). Recently, Singh (1986) used this research framework to investigate the relationship between oranizational performance and risk taking. He found the direct relationship, triggered by

TABLE 2
Behavioral Risk-Return Studies

Author	Types of Studies	Findings
Friedman & Savage (1948)	Theoretical	Utility functions a mixture of risk seeking and risk aversion. Three-segment function: convex (risk seeking) surrounded by two concave segments.
Markowitz (1952)	Theoretical	Proposed a four-segment bounded utility function of wealth; convex-concave-convex (around present wealth)-concave.
Grayson (1959)	Empirical	Nine executives engaged in oil and gas drilling decisions. Utility functions mixture of risk seeking and risk aversion in domain of losses; evidence of risk seeking behavior for gains.
Swalm (1966)	Empirical	Thirteen executives in chemical industry; 9 out of 13 utility functions were risk averse for gains; risk seeking for losses.
Fishburn (1977)	Theoretical	Specified a mean-risk dominance model in which risk is measured by a probability-weighted function of deviations *below a specified target return*.
Fishburn & Kochenberger (1979)	Empirical	Used data from earlier studies. Predominant form of risk preference involved convexity (risk seeking) *below target* returns and concavity (risk aversion) for above-target returns.
Kahneman & Tversky (1979)	Empirical	Provided a substantial amount of empirical laboratory evidence to support the proposition that the utility function will be convex for losses and concave for gains, with gains and losses measured relative to a *target return*.
Laughhunn, Payne, & Crum (1980)	Empirical	Provided extensive laboratory evidence using 237 managers to support decision makers' use of a *target return* or reference point in the analysis of risky choice behavior.

TABLE 2 (continued)

Author	Types of Studies	Findings
Singh (1986)	Empirical	Cross-sectional sample of 64 medium-to-large U.S. and Canadian companies. Found that organizational performance has a negative relationship with risk taking in organizational decision making, and that poorly performing organizations engage in more risk taking than organizations that are performing well.

performance below acceptable levels, to be negative but found the indirect relationships, which are mediated by organizational slack and decentralization, to be positive.

RESEARCH HYPOTHESES AND METHODS

According to prospect theory, the risk-return relationship has a nonlinear functional form. Below the target return level, decision makers are risk seeking, and above the target level, decision makers are risk averse. Therefore, assuming individual decision maker's and firm's risk preferences are in one-to-one correspondence, we can state our broad formal research hypotheses.

> *Hypothesis 1: A negative association between risk and return exists for firms below target return levels.*
>
> *Hypothesis 2: A positive association between risk and return exists for firms above target return levels.*

More focused research hypotheses are:

> *Hypothesis 1a: A negative association between risk and return exists for firms below target return levels within industries.*
>
> *Hypothesis 1b: A negative association between risk and return exists for firms below target return levels across industries.*
>
> *Hypothesis 2a: A positive association between risk and return exists for firms above target return levels within industries.*
>
> *Hypothesis 2b: A positive association between risk and return exists for firms above target return levels across industries.*

Determining a Target Level

An important issue in operationally defining prospect theory is to identify a measure for the target return level. There is no general rule that defines an appropriate target for each situation, although Tversky and Kahneman (1981) and Laughhunn, Payne, and Crum (1980) drew a close analogy between a target return level and a reference point. In this study, the traditional literature of financial statement analysis provided a basis for setting an appropriate return target. Lev (1969: 290) suggested that firms adjust their performance to the industry average. He emphasized "the desirability of adjusting the firm's financial ratios to predetermined targets which are usually based on industry wide averages." Lev also performed an empirical study on 900 major U.S. firms, in which he confirmed the hypothesis that firms periodically adjusted their financial ratios to their industry means. Frecka and Lee (1983) used another data set for a study of financial ratios, and their results support Lev's hypothesis that firms adjust financial ratios in a dynamic fashion to targets that appear to be industry-wide averages of those ratios. Therefore, an average performance (return) level may serve as an appropriate proxy for a given firm's target level.

Since the purpose of this study was to test the nature of the assocation between risk and return both within and across industries, we used two different target return levels. First, for firms within the same industry, the industry's median return on equity (ROE) was the target measure.[1] Second, the overall median ROE was used as the target across industries.

Time Period, Measures, and Data

The COMPUSTAT data base was used to develop a research data set of firms and industries for the 1960–79 time period. We chose that period because it represented a wide range of economic and environmental conditions and also covered the range of time periods examined in Bowman's (1980, 1982) studies. Separate analyses were then performed for the nonoverlapping 5-year periods 1960–64, 1965–69, 1970–74, and 1975–79, for the 10-year periods 1960–69 and 1970–79, and finally, for the entire 20-year period 1960–79. We analyzed different time periods in order to examine the possibility that time period influences risk-return results. For each period, we calculated the average ROE and variance of ROE as accounting-based measures of firm return and risk. Many researchers have used the variance of a firm's return over time as a proxy for risk[2] (Armour & Teece, 1978; Bettis, 1981; Bettis & Hall, 1982; Bowman, 1980; Christensen & Montgomery, 1981; Fisher & Hall, 1969; Rumelt, 1974). Accounting measures of risk were used in this study so that the research results would be comparable with previous studies—

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[1] We chose the median ROE because it represents the middle point of the return distribution and is unaffected by extreme outliers. Thus, the median may better indicate managerial perceptions of target performance than the mean.

[2] Apart from correspondence with previous studies, two other considerations led us to evaluate total risk, or variance of returns, rather than systematic risk (beta). First, managers are responsible to a wider set of stakeholders (Freeman, 1984) than just shareholders, making the examination of total risk an important concern. Second, beta is both empirically and theoretically related to total risk (Foster, 1978).

particularly Bowman's 1980 and 1982 studies—that have used the same measures.

In order to examine Hypotheses 1a and 2a, which concern the nature of the risk-return association within industries, the following procedure was adopted. For each time period, we calculated the average ROE and variance of ROE as measures of return and risk for each firm in each Standard Industrial Classification (SIC) two-digit industry. Only industries with at least five firms below and five firms above the target level were included. Within each industry, we constructed a rank order of all firms based on average ROE for the time period and divided it at the median. Firm with values for ROE below an industry's median were considered as below target, and vice-versa. The total population included 47 industries and 2,322 firms for 1975–79, the latest period that we analyzed.

Hypotheses 1b and 2b, which concern risk-return patterns across industries, were examined in a similar manner. As in the case of the industry-level research, we calculated the average ROE and variance of ROE as measures of return and risk for each firm for each time period. We then constructed a rank order of all firms across all industries based on average ROE for the time period and divided it at the median. We considered firms below the median as below target, and vice versa. Again, the population included 2,322 firms for 1975–79.

Statistical Tests for Investigating the Risk-Return Association

Two basic nonparametric approaches were used to examine the association between risk and return. First, we performed contingency table analysis, following methods used in previous research (Bowman, 1980; Fiegenbaum & Thomas, 1985, 1986). For each category—below target return and above target return—we constructed a rank order of all firms for each of the two characteristics, ROE (return) and variance in ROE (risk), and divided the rank order at the median. We then deemed each firm as high or low on each of the characteristics, in effect producing four quadrants in a two-by-two contingency table: high ROE, high variance (HH); high ROE, low variance (HL); low ROE, high variance (LH); and low ROE, low variance (LL). We then calculated negative risk-return association ratios[3] (HL + LH divided by HH + LL) for each category, for each SIC two-digit industry, for each time period, and for all firms pooled across industries.

Second, measures of risk-return association based on Spearman rank order correlation coefficients (Winkler & Hays, 1975: 867) were calculated from the risk-return rank order data derived from the industry and firm risk-return analyses.

Thus, Spearman rank order correlations and negative association ratios were calculated for each SIC two-digit industry and for the entire group of firms. We repeated the procedure for each of the seven time periods, 1960–64, 1965–69, 1970–74, 1975–79, 1960–69, 1970–79, and 1960–79.

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[3] A negative association is implied if the values of the calculated negative association ratios are significantly above 1.0. Similarly, there is a positive association if the ratios are significantly below 1.0.

RESULTS

Appendices A and B present detailed research results for the benefit of future researchers. However, Tables 3 through 6 summarize the main results.

Results for Below-Target-Level Firms

Industry level. The risk-return association was calculated for each industry. Table 3 presents the results of both the Spearman correlation and negative association ratio analyses. In the case of the Spearman risk-return correlation analysis, negative risk-return correlations emerged for most industries in each time period. We performed a binomial test, similar to Bowman's (1980) version, to test the null hypothesis that there is no association between risk and return, or equal numbers of positive and negative correlations ($p = 0.50$). We rejected that hypothesis in favor of the alternative hypothesis that risk and return are negatively correlated at $p < .01$ for each time period (see column 2.) When we considered only industries with a significant positive or negative association between risk and return (column 3), we found that negative association was the dominant mode (column 4).

The negative association ratio results (column 5) also support the dominance of negative risk-return associations; most ratios are significantly greater than 1.0 across industries.

Firm level. The ROE median was calculated for all firms, pooled across industries. The left-hand side of Table 4 presents the values of both the Spearman correlation and the negative association ratio for below-target firms. For every time period, the Spearman risk-return correlation is significantly negative ($p < .01$). The negative association ratio analysis confirms those results, showing that the values of the ratios are consistently greater than 1.0 for all time periods. Therefore, the results shown in Table 4 strongly support Hypothesis 1b across a wide range of industries.

In summary, the results in Tables 3 and 4 support Hypothesis 1, stating that a negative association exists between risk and return for firms with ROEs below the target level for all time periods. In addition, this hypothesis is strongly confirmed both within (Hypothesis 1a) and across (Hypothesis 1b) industries.

Results for Above-Target-Level Firms

Industry level. Table 5 describes the results of both the Spearman analysis and the positive association ratio analysis (the inverse of the negative association ratio). For most industries, positive and highly significant Spearman risk-return correlations emerged (see column 2). When the number of industries with a significant positive association was compared with the number of industries with any significant association, virtually all industries showed a positive association for all periods except 1975–79 (see column 4).

TABLE 3
Risk-Return Association For Firms Below Industry Target Level[a]

Time Period	Number of Industries	Spearman Correlation Analysis: Industries with Negative Association	Spearman Correlation Analysis: Industries with Significant Association	Spearman Correlation Analysis: Industries with Significant Negative Association	Negative Association Ratio Analysis: · Industries with Negative Association Ratio
1960–64	34	30 (88)**	19	19 (100)**	23 (67)**
1965–69	41	34 (83)**	20	18 (90)**	29 (70)**
1970–74	46	44 (96)**	38	38 (100)**	41 (89)**
1975–79	47	47 (100)**	32	32 (100)**	42 (89)**
1960–69	36	34 (94)**	16	16 (100)**	26 (72)**
1970–79	47	47 (100)**	38	38 (100)**	44 (94)**
1960–79	46	45 (97)**	34	34 (100)**	42 (91)**

[a] Figures in parenthesis represent results as a percentage of (left to right) the total number of industries $\left(\frac{\text{column 2}}{\text{column 1}}\right)$, the number of industries with a significant positive or negative association $\left(\frac{\text{column 4}}{\text{column 3}}\right)$, and the total number of industries $\left(\frac{\text{column 5}}{\text{column 1}}\right)$.

** $p < .01$. Bowman's binomial test.

TABLE 4
Statistics for Firms' Risk-Return Associations Below and Above Target Across Industries

	Below Target			Above Target			
Time Period	Spearman Rank Order Correlations	Negative Association Ratios	Number of Companies	Spearman Rank Order Correlations	Negative Association Ratios	Number of Companies	Total Number of Companies
1960–64	−.45**	1.84	705	.42**	.57	705	1,410
1965–69	−.42**	1.70	946	.55**	.42	946	1,892
1970–74	−.59**	2.27	1,166	.36**	.63	1,166	2,332
1975–79	−.60**	2.30	1,210	.36**	.61	1,210	2,420
1960–69	−.48**	2.00	807	.50**	.52	807	1,614
1970–79	−.63**	2.87	1,197	.40**	.60	1,197	2,394
1960–79	−.59**	2.35	1,161	.49**	.51	1,161	2,322

** $p < .01$

TABLE 5

Risk-Return Associations For Firms Above Industry Target Level[a]

		Spearman Correlation Analysis			Positive Association Ratio Analysis
Time Period	Number of Industries	Industries with Positive Association	Industries with Significant Association	Industries with Significant Positive Association	Industries with Positive Association Ratio
1960–64	34	29 (85)**	11	11 (100)**	29 (85)**
1965–69	41	38 (93)**	29	29 (100)**	37 (90)**
1970–74	46	42 (91)**	22	22 (100)**	34 (74)**
1975–79	47	35 (77)**	18	17 (95)**	31 (66)**
1960–69	36	36 (100)**	20	20 (100)**	34 (94)**
1970–79	47	36 (77)**	27	27 (100)**	35 (75)**
1960–79	46	42 (91)**	25	25 (100)**	38 (83)**

[a] Figures in parenthesis represent results as a percentage of (left to right) the total number of industries $\left(\frac{\text{column 2}}{\text{column 1}}\right)$, the number of industries with a significant positive or negative association $\left(\frac{\text{column 4}}{\text{column 3}}\right)$, and the total number of industries $\left(\frac{\text{column 5}}{\text{column 1}}\right)$.

$^{**}p < .01$, Bowman's binomial test.

The positive association ratios (column 5) further confirm the findings of the Spearman risk-return correlation analysis.

Firm level. We again pooled all firms across industries. For each time period, the Spearman risk-return correlation coefficient is strongly positive ($p < .01$; right-hand side of Table 4). Further, the calculated negative association ratios were less than 1.0 for all time periods, indicating that risk and return are positively correlated.

In summary, the results shown in Tables 4 and 5 demonstrate the existence of a positive association between risk and return for firms with ROEs above the target level for all time periods. This finding holds both within (Hypothesis 2a) and across (Hypothesis 2b) industries and validates our second general hypothesis.

DISCUSSION, CONCLUSIONS, AND FURTHER DIRECTIONS

This study's results, based on COMPUSTAT data for U.S. industrial firms for a wide range of periods between 1960–79, strongly support propositions drawn from prospect theory. Earlier studies (Fiegenbaum & Thomas, 1985, 1986) have shown that the risk-return association may be either positive or negative, depending on the period chosen. In contrast, the main contribution of this study is that it showed that, when a target ROE value is introduced at either the firm or industry level, risk and return are negatively correlated for below-target firms and positively correlated for above-target firms regardless of the period or the underlying environmental conditions. Those findings suggest, in line with the behavioral assumptions of prospect theory, that most firms may be risk seeking when they are suffering losses or are below targeted aspiration levels. Conversely, they will tend to be risk averse following achievement of aspirations and targets.

The results of this study also provide confirmation of Bowman's (1982, 1984) conjectures about risk seeking in troubled firms. Bowman's empirical studies, which involved content analysis of annual reports for three industries over the 1972–80 period, provided limited justification for the notion that managerial risk attitudes, such as risk seeking in troubled environments, could explain the risk-return paradox. However, this study provided extensive confirmation of hypotheses based on both risk-attitude and prospect theory because it involved a wide range of environmental conditions over the period 1960–79 and a large population covering 47 industries.

In Figure 1, which graphically shows this study's results, two illustrative lines describe the association between risk and return. Line 1 represents a consistently negative risk-return association, and line 2 represents a consistently positive risk-return association. However, the results derived from this study suggest that the risk-return relationship in both cases is nonlinear and U-shaped as curves 3 and 4 respectively exemplify.[4] The curves may therefore represent the true relationship between risk and return.

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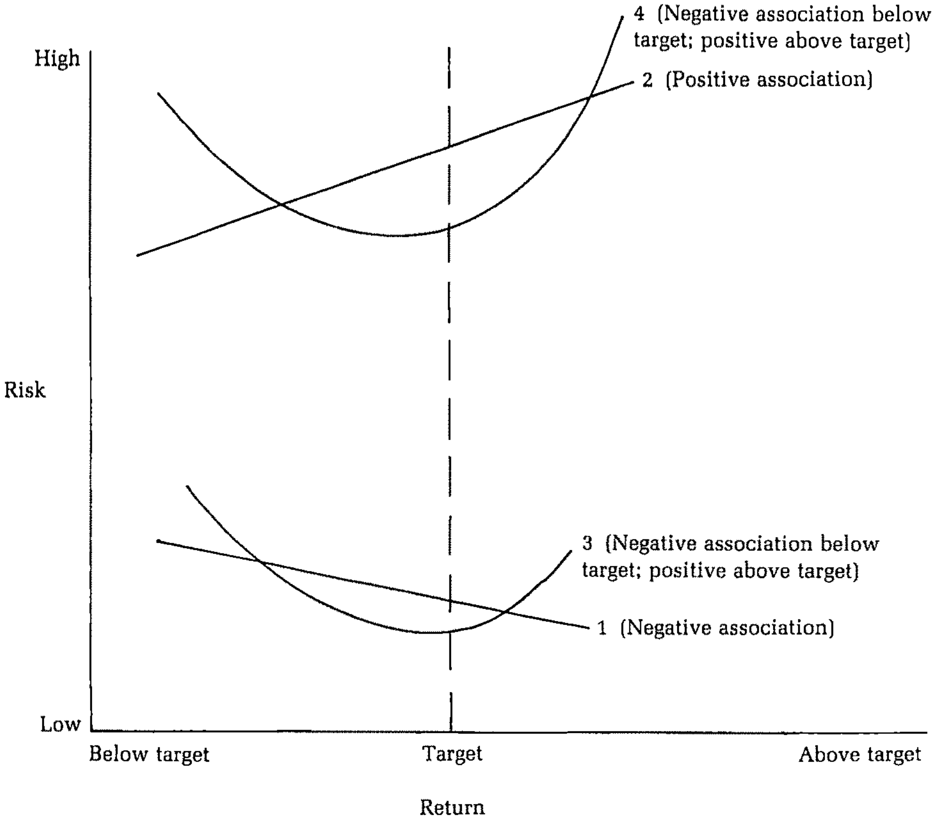
[4] Curves of the risk-return relationships were plotted for a small number of industries for each time period studied. Although those subgroup results provided strong support for the U-shaped function, we did not undertake a full evaluation of all industries for all time periods.

FIGURE 1
Risk-Return Relationships



4 (Negative association below target; positive above target)
2 (Positive association)
3 (Negative association below target; positive above target)
1 (Negative association)
High
Risk
Low
Below target
Target
Above target
Return

If the U-shaped function is a realistic representation of the risk-return association, it seems sensible to examine the risk-return association for firms with returns close to a target level. Prospect theory would suggest that there will be a very low association between risk and return when firms near the target level are considered. In order to test that hypothesis, we divided the group of firms into tertiles representing below-target, target, and above-target segments. Spearman rank order correlations were calculated at both the firm and industry levels. Table 6 presents the results for only the middle segment.

Most of the industries around the middle, target-segment, tertile show no significant association between risk and return (column 2). Spearman correlations calculated across firms also show little evidence of a significant association between risk and return (column 3). The findings support the hypothesis that there is no significant correlation around the target level.

Although the proposed U-shaped risk-return relationship appears to be an appropriate model to explain observed risk-return relationships, further research should concentrate on the nature of risk-return trade-offs for firms that are categorized as either below or above target level. Such research should be carried out first at the industry level in order to control for factors

TABLE 6
Results of Spearman Rank Order Analysis for Firms Around the Target Level Within and Across Industries

Time Period	Number of Industries	Within Industries—Industries with Significant Association[a]	Across Firms
1960–64	34	1 (2.9)	−.03
1965–69	41	7 (17.0)	.16 **
1970–74	46	4 (8.6)	−.03
1975–79	48	5 (10.4)	−.11 **
1960–69	36	4 (11.1)	.06
1970–79	47	6 (12.7)	−.05
1960–79	46	6 (13.0)	.001

[a] Figures in parentheses represent the percentage of industries with a significant positive or negative association $\left(\frac{\text{column 2}}{\text{column 1}}\right)$.

** $p < .01$.

and characteristics explaining risk at that level (Baird & Thomas, 1985). Within a given industry, some below-target firms may exhibit behavioral tendencies like escalating commitment to particular courses of action (Staw, 1981)[5] or organizational inertia in changing circumstances (MacMillan & McCaffery, 1982) that may, in turn, lead to the possibility of high risks and low returns. However, some large firms may be able to trade off risk and return to achieve high returns and low risks and achieve above-target performance. However, factors like organizational rigidity or X-inefficiency[6] (Leibenstein, 1966) may impede other large firms from achieving high return–low risk profiles. Further studies along the lines of d'Aveni's (1985) paper on risk-return strategy trade-offs in the forest products industry should provide insights about the nature of risk-return trade-offs within particular industries. In addition, other managerial explanations—such as agency theory and diversification strategy—can be tested more fully in rich, fine-grained (Harrigan, 1983) studies of single industries that address how managers frame risky choices (Tversky & Kahneman, 1981). Such rich studies are also fully consistent with Bowman's (1980: 27) suggestion that industry-specific characteristics like regulation or context (service vs. manufacturing, for example) may provide a basis for reasonable conjectures about the causes of observed risk-return trade-offs and thus enrich our understanding of the factors influencing negative risk-return associations.

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[5] Whyte (1986) argued that prospect theory provides the psychological mechanisms by which to explain escalating commitment to a failing course of action without the need to invoke self-justification processes.

[6] Leibenstein defined the efficiency level that a firm actually achieves as its "X-efficiency" and termed the shortfall of a firm's actual efficiency relative to the efficiency it could achieve its "X-inefficiency." He further argued that X-inefficiency will tend to increase over time unless counteracted by forces within an organization like managerial skills in planning, control, and work organization.

The prospect theory and risk-attitude explanations of the risk-return paradox raise the question of whose risk or return is important. Is a manager acting as an agent for a firm's principal owners, or is a manager's appropriate role to enhance the strategic management capability of the organization? Therefore, the relevant issue is to identify which stakeholders affect and shape the achievement of an organization's mission. Further, an important empirical issue is whether the risk-return paradox exists when the risk perspectives of appropriate alternative stakeholders are taken into account.

The set of all constituencies of an organization can include owners, customers, employees, and suppliers as internal stakeholders and government and competitors as external stakeholders (Freeman, 1984). Although managerial, or personal, risk may be best measured using the total risk (variance) concept, firm-level risk may be more appropriately measured by the systematic risk (beta) concept. Measures of variance involve the arbitrary definition of a utility function for a firm. The advantage of identifying a firm's risk with its shareholders' risk is that doing so is consistent with the classic assumption that a firm operates in the interests of its owners and thus enables risk to be identified and priced in securities markets.

Our earlier study (Fiegenbaum & Thomas, 1986) showed that Bowman's risk-return paradox only exists if total risk, not market (shareholders') risk, is taken into account. Clearly, any risk study should confront the issue of what risk measure is appropriate in a given environment or situation. *Market risk*, ruin, *lack of predictability*, and *personal risk* are all potential measures of risk, or risk constructs, in given situations. However, the choice of risk perspective will surely enlighten us as to the nature of the association between risk and return and the possible presence of the risk-return paradox.

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APPENDIX A
Negative Association Ratios for Below and Above Industry Target[a]

SIC	1960–64			1965–69			1970–74			1975–79			1960–69			1970–79			1960–79		
Group	Below	Above	*N*	Below	Above	*N*	Below	Above	*N*	Below	Above	*N*	Below	Above	*N*	Below	Above	*N*	Below	Above	*N*
10	1.33	.85	(13)	1.42	.60	(16)	.88	.33	(16)	1.42	.33	(16)	2.00	.75	(14)	4.66	.60	(16)	1.42	.14	(16)
12							4.00	4.00	(5)	.00	.50	(6)				2.00	.66	(6)	4.00	.66	(5)
13	.85	.50	(12)	2.66	.57	(22)	3.42	.47	(31)	1.69	1.33	(35)	1.25	.88	(17)	1.83	.41	(34)	3.42	.34	(31)
15				1.33	2.00	(6)	2.00	1.00	(12)	2.00	2.00	(12)				2.00	2.00	(12)	5.00	2.00	(12)
16	.00	.66	(5)	.40	.40	(7)	8.00	.80	(9)	2.00	.28	(9)	2.00	.50	(6)	8.00	.80	(9)	2.00	.80	(9)
20	1.62	.64	(41)	1.36	.66	(45)	1.88	.06	(48)	1.50	.68	(49)	1.75	.46	(44)	1.88	.48	(49)	2.76	.60	(48)
21										4.00	.00	(5)				.66	.00	(6)			
22	3.33	.44	(13)	.80	.54	(17)	4.00	.71	(24)	3.33	.47	(25)	1.14	.60	(15)	3.33	.47	(26)	1.77	.50	(24)
23	1.33	.85	(13)	1.50	.22	(19)	2.85	.44	(26)	13.00	.80	(27)	1.14	.66	(15)	2.85	.85	(27)	2.85	.40	(26)
24	2.00	.00	(5)	1.50	.28	(9)	4.00	.75	(14)	2.00	1.00	(15)	.40	.33	(7)	4.00	1.66	(16)	2.50	1.33	(14)
25				.00	.66	(5)	.00	.66	(5)	2.00	4.00	(5)				2.00	4.00	(5)	.00	.66	(5)
26	2.00	.80	(18)	1.50	.46	(19)	2.00	2.00	(21)	3.20	.90	(21)	.80	.50	(18)	6.00	.90	(21)	3.20	1.00	(20)
27	5.00	.50	(12)	1.50	.72	(19)	1.40	.53	(23)	1.00	.20	(24)	.75	.44	(13)	1.40	.20	(24)	2.00	.35	(23)
28	1.52	.59	(49)	1.57	.50	(48)	1.16	.73	(52)	2.23	1.25	(54)	1.64	.66	(48)	1.89	.50	(54)	1.60	.62	(52)
29	2.33	.46	(19)	2.00	.66	(20)	3.00	.76	(23)	2.00	.35	(23)	2.33	.66	(20)	1.40	.35	(23)	1.40	.53	(23)
30	1.14	1.14	(15)	.72	.72	(19)	.66	1.50	(20)	1.33	.90	(21)	2.40	.33	(16)	1.50	.66	(20)	2.33	.42	(20)
31	2.00	.50	(6)	3.00	1.00	(8)	2.00	.28	(9)	.66	.80	(9)	6.00	.50	(5)	2.00	.28	(9)	.80	.80	(9)
32	.85	.20	(12)	1.14	.33	(15)	2.80	.50	(18)	2.33	1.50	(20)	.75	.75	(14)	5.33	.46	(19)	1.11	.28	(18)
33	2.50	.80	(27)	2.00	.60	(32)	2.18	.70	(34)	2.18	.88	(34)	2.50	.55	(28)	2.18	.54	(34)	2.18	.70	(34)
34	3.66	.42	(27)	1.46	.60	(37)	2.30	.75	(42)	2.46	.55	(45)	2.00	.36	(30)	4.50	.69	(44)	2.30	.61	(42)
35	1.08	.66	(50)	1.42	.41	(68)	2.33	.83	(79)	2.32	.78	(82)	2.00	.70	(53)	2.85	.66	(80)	2.43	.69	(78)
36	2.28	.76	(46)	2.00	.66	(60)	4.30	.78	(68)	2.13	.80	(72)	3.07	.73	(52)	5.00	.65	(71)	2.28	.61	(68)
37	1.83	.94	(33)	1.11	.35	(38)	1.86	.75	(42)	1.70	.72	(43)	1.53	.38	(36)	2.30	.48	(43)	1.86	.50	(42)
38	1.00	.33	(16)	1.60	.47	(25)	2.22	.55	(28)	2.00	.93	(29)	1.00	.42	(20)	4.00	.70	(29)	3.14	.55	(28)

APPENDIX A (continued)

SIC	1960–64			1965–69			1970–74			1975–79			1960–69			1970–79			1960–79		
Group	Below	Above	*N*	Below	Above	*N*	Below	Above	*N*	Below	Above	*N*	Below	Above	*N*	Below	Above	*N*	Below	Above	*N*
39	.00	.33	(8)	2.00	.57	(11)	2.40	.54	(17)	2.00	.88	(17)	2.00	.28	(9)	2.40	.88	(17)	2.40	.60	(16)
40				2.00	.66	(5)	.80	1.00	(8)	.80	2.00	(9)	4.00	.00	(5)	.80	.80	(9)	.00	3.00	(8)
42	.20	1.00	(8)	1.50	.28	(9)	10.00	.22	(11)	1.20	.22	(11)	8.00	.33	(8)	2.66	.22	(11)	2.66	.25	(10)
45	2.66	.57	(11)	2.00	.20	(12)	3.33	1.60	(13)	1.33	1.60	(13)	10.00	.57	(11)	.00	3.33	(13)	3.33	.44	(13)
48	.57	.22	(11)	1.60	.20	(12)	1.33	.75	(14)	2.50	.40	(14)	5.00	.50	(12)	2.50	.16	(14)	2.50	.16	(14)
49	.90	.52	(76)	.92	.92	(79)	1.51	.74	(82)	.79	.53	(86)	1.33	.87	(77)	1.38	.72	(86)	1.67	.64	(82)
50	3.33	.85	(13)	.66	.66	(20)	4.40	1.16	(26)	3.66	1.45	(27)	1.14	.75	(14)	3.66	1.07	(27)	1.45	.44	(26)
51	4.00	2.00	(9)	3.33	.44	(13)	2.00	.60	(15)	1.42	.33	(16)	1.20	.25	(10)	3.00	.60	(16)	2.00	.60	(15)
53	4.00	1.14	(15)	.72	.72	(19)	1.27	.71	(24)	4.00	.25	(24)	1.00	.60	(16)	4.00	1.00	(24)	1.27	.71	(24)
54	.75	.85	(13)	1.42	.88	(17)	4.00	1.00	(20)	4.00	1.00	(20)	2.00	1.14	(15)	2.33	1.00	(20)	2.33	.66	(20)
56				.50	2.00	(6)	3.00	1.00	(8)	2.00	.33	(8)				3.00	3.00	(8)	3.00	3.00	(8)
58				.40	.50	(6)	4.00	.25	(10)	1.50	1.50	(10)				4.00	1.50	(10)	4.00	.25	(10)
59	2.00	.22	(11)	4.00	.36	(15)	1.09	.57	(22)	2.00	1.40	(24)	.85	.85	(13)	2.00	.53	(23)	2.28	1.20	(22)
60	.76	1.75	(22)	.96	.83	(57)	1.31	1.03	(67)	1.61	1.57	(67)	1.36	.62	(52)	1.83	2.94	(67)	1.31	1.16	(67)
61	6.00	.40	(7)	2.00	.57	(11)	1.33	.85	(13)	2.50	.40	(14)	.40	.40	(7)	2.50	.44	(13)	2.50	.18	(13)
63							2.33	1.11	(19)	1.20	1.20	(22)				1.75	.83	(22)	1.50	.72	(19)
65				6.00	1.33	(7)	1.60	1.00	(12)	14.00	.75	(14)				2.00	.75	(14)	1.60	2.00	(12)
67							3.00	.14	(16)	16.00	.60	(16)				4.66	.60	(16)	7.00	.60	(16)
70				.00	.50	(6)	1.33	.40	(7)	1.33	1.33	(7)	.66	.00	(5)	1.33	1.33	(7)	1.33	.50	(6)
73	.80	.80	(9)	1.33	.25	(20)	6.00	.40	(28)	4.80	.27	(28)	1.14	.40	(14)	4.80	.40	(28)	3.66	.27	(28)
80							.00	.28	(9)	1.50	.80	(9)				4.00	2.00	(9)	1.50	.80	(9)
89							2.00	.66	(5)	2.00	.50	(6)				2.00	.00	(5)	.00	.66	(5)
99	1.33	.33	(7)	.80	.00	(9)	1.50	.25	(10)	4.00	1.50	(10)	.80	1.00	(8)	1.50	.25	(10)	1.50	.00	(10)

[a] *N* gives the number of firms in each category. In every case there are an equal number of firms in the below- and above-target categories.

APPENDIX B

Spearman Correlations for Below and Above Industry Target[a]

SIC	1960–64			1965–69			1970–74			1975–79			1960–69			1970–79			1960–79		
Group	Below	Above	N	Below	Above	N	Below	Above	N	Below	Above	N	Below	Above	N	Below	Above	N	Below	Above	N
10	–.46*	–.17	(13)	–.17	.56	(16)*	–.09	.68	(16)*	–.31	.40	(16)	–.48*	.19	(14)	–.75*	.54	(16)*	–.53*	.60	(16)*
12							–.80*	–.80	(5)	–.77*	.54	(6)				–.88*	.10	(5)	–.90*	.10	(5)
13	–.19	.22	(12)	–.69*	.35	(22)*	–.66*	.48	(31)*	–.34*	–.06	(35)	–.62*	.21	(17)	–.49*	.36	(34)*	–.57*	.34	(31)*
15				.17	–.54	(6)	–.58*	.20	(12)	–.56*	–.34	(12)				–.55*	–.27	(12)	–.70*	–.27	(12)
16	–.71	.40	(5)	–.03	.21	(7)	–.90*	.16	(9)	–.65*	.66	(9)*	–.42	.60	(6)	–.75*	.16	(9)	–.75*	.20	(9)
20	–.31*	.47	(41)*	–.32*	.36	(45)*	–.48*	.35	(48)*	–.49*	.34	(49)*	–.40*	.54	(44)*	–.49*	.48	(49)*	–.67*	.40	(48)*
21										–.60	.70	(5)				–.20	1.00	(5)*			
22	–.57*	.17	(13)	–.06	.42	(17)*	–.51*	.23	(24)	–.87*	.51	(25)*	–.24	.41	(16)	–.82*	.38	(25)*	–.68*	.57	(24)*
23	–.34	.39	(13)	–.49*	.70	(19)*	–.67*	.44	(26)*	–.84*	.03	(27)	–.06	.58	(15)*	–.70*	.42	(26)*	–.61*	.56	(26)*
24	–.37	.60	(5)	–.15	.51	(9)	–.82*	.38	(14)	–.77*	.10	(16)	.14	.33	(7)	–.83*	–.10	(16)	–.89*	.23	(14)
25				.90*	.70	(5)	–.82*	–.30	(5)	–.60	–.50	(5)				–.77*	–.80	(5)	–.94*	.70	(5)
26	–.36	.24	(18)	–.33	.64	(19)*	–.43*	–.18	(21)	–.45*	.35	(21)	–.18	.49	(18)*	–.69*	–.01	(21)	–.66*	.25	(20)
27	–.70*	–.04	(12)	–.46*	.38	(19)*	–.53*	.45	(23)*	–.07	.64	(24)*	–.01	.17	(13)	–.21	.52	(24)*	–.30	.64	(23)*
28	–.33*	.42	(43)*	–.42*	.43	(48)*	–.27*	.33	(52)*	–.54*	.14	(54)*	–.36*	.34	(40)*	–.44*	.40	(54)*	–.33*	.51	(52)*
29	–.56*	.41	(19)*	–.51*	.42	(20)*	–.40*	.25	(23)	–.42*	.72	(23)*	–.56*	.48	(20)*	–.29	.52	(23)*	–.38*	.63	(23)*
30	–.31	–.12	(15)	.007	.49	(19)*	.18	–.09	(20)	–.56*	.13	(21)	–.26	.54	(16)*	–.44*	.33	(20)	–.33	.60	(20)*
31	–.65	.48	(6)	–.33	.61	(8)*	–.68*	.71	(9)*	–.006	.30	(9)	–.89*	.65	(6)	–.38	.70	(9)*	–.06	.41	(9)
32	–.10	.36	(12)	–.15	.51	(16)*	–.78*	.62	(18)*	–.55*	.21	(20)	–.03	.42	(14)	–.84*	.58	(19)*	–.53*	.46	(18)*
33	–.75*	.13	(27)	–.54*	.49	(32)*	–.59*	.40	(34)*	–.52*	.23	(34)	–.64*	.31	(28)*	–.60*	.47	(34)*	–.58*	.36	(34)*
34	–.72*	.62	(27)*	–.51*	.47	(37)*	–.70*	.33	(42)*	–.60*	.43	(45)*	–.48*	.55	(30)*	–.57*	.43	(44)*	–.45*	.55	(42)*
35	–.22	.31	(50)*	–.38*	.58	(68)*	–.66*	.25	(79)*	–.60*	.37	(80)*	–.41*	.37	(53)*	–.68*	.30	(80)*	–.53*	.38	(78)*
36	–.57*	.28	(58)*	–.54*	.40	(60)*	–.74*	.23	(68)*	–.65*	.21	(72)*	–.60*	.28	(52)*	–.76*	.23	(71)*	–.57*	.47	(68)*
37	–.56*	.12	(33)	–.28*	.65	(38)*	–.63*	.42	(42)*	–.47*	.29	(43)*	–.54*	.58	(36)*	–.59*	.42	(43)*	–.48*	.54	(42)*
38	.05	.30	(16)	–.41*	.55	(25)*	–.60*	.25	(28)	–.61*	.22	(29)	–.32	.53	(20)*	–.66*	.29	(29)	–.55*	.18	(28)

APPENDIX B (continued)

SIC	1960–64			1965–69			1970–74			1975–79			1960–69			1970–79			1960–79		
Group	Below	Above	N	Below	Above	N	Below	Above	N	Below	Above	N	Below	Above	N	Below	Above	N	Below	Above	N
39	–.95*	.42	(8)	–.58*	.34	(11)	–.54*	.24	(17)	–.75*	.31	(17)	–.81*	.43	(9)	–.69*	.16	(17)	–.70*	.20	(16)
40				–.54	–.30	(5)	.35	.16	(8)	–.05	–.18	(9)	–.60	.70	(5)	–.16	.26	(9)	.59	–.19	(8)
42	–.60*	.14	(8)	–.64*	.89	(9)*	–.87*	.61	(11)*	–.24	.70	(11)*	–.73*	.71	(8)*	–.64*	.69	(11)*	–.54*	.95	(10)*
45	–.53*	.11	(11)	–.72*	.79	(12)*	–.64*	.06	(13)	–.27	–.56	(13)*	–.70*	.60	(11)*	–.86*	–.08	(13)	–.72*	.21	(13)
48	.06	.56	(10)*	–.60*	.78	(12)*	–.22	.20	(14)	–.37	.60	(14)*	–.58*	.51	(14)*	–.52*	.70	(14)*	–.36	.78	(14)*
49	.09	.38	(76)*	–.04	.24	(79)*	–.25*	.21	(82)*	–.11	.34	(86)*	–.12	.20	(77)*	–.18*	.37	(86)*	–.33*	.39	(82)*
50	–.51*	.26	(13)	.15	.50	(20)*	–.73*	.25	(26)	–.64*	.23	(27)	–.36	.09	(14)	–.71*	.25	(29)	–.50*	.43	(13)*
51	–.64*	.15	(9)	–.52*	.80	(13)*	–.60*	.25	(16)	–.33	.64	(16)*	–.32	.62	(10)*	–.64*	.50	(16)*	–.46*	.52	(15)*
53	–.65*	.32	(15)	.15	.23	(19)	–.22	.54	(24)*	–.53*	.53	(24)	–.05	.31	(16)	–.45*	.39	(24)*	–.03	.25	(24)
54	–.29	.03	(13)	–.26	.35	(17)	–.72*	.14	(20)	–.79*	–.02	(20)	–.19	.43	(15)*	–.71*	–.14	(20)	–.46*	.05	(20)
56				–.02	–.65	(6)	–.90*	.07	(8)	–.83*	.35	(8)				–.90*	–.33	(8)	–.52	–.26	(8)
58				.50	.71	(7)	–.67*	.67	(10)*	–.73*	–.26	(10)				–.67*	–.13	(10)	–.55*	.66	(10)*
59	–.55*	.78	(11)*	–.39	.62	(15)*	–.19	.50	(22)*	–.60*	–.25	(24)	–.20	.48	(13)*	–.36*	.41	(23)*	–.50*	.37	(22)*
60	.11	–.17	(22)	–.03	.33	(57)*	–.18	.06	(67)	–.47*	–.17	(67)	.0006	.40	(52)*	–.57*	.47	(67)*	–.36*	–.16	(67)
61	–.92*	.67	(7)*	–.17	.50	(11)*	–.49*	.15	(13)	–.63*	.78	(14)*	–.21*	.53	(7)	–.39	.51	(13)*	–.36	.76	(13)*
63							–.49*	.09	(19)	–.06	–.06	(22)				–.57*	.04	(22)	–.52*	.16	(19)
65				–.03	.28	(7)	–.53*	.03	(12)	–.66*	–.29	(14)				–.26	.09	(14)	–.28	–.47	(12)
67							–.77*	.78	(16)*	–.88*	.46	(16)*				–.82*	.38	(16)	–.83*	.39	(16)
70				–.77*	.60	(6)	–.42	.60	(7)	–.28	–.03	(7)	–.50	.60	(5)	–.10	–.03	(7)	–.60	.25	(6)
73	–.23	–.05	(9)	–.22	.54	(20)*	–.77*	.62	(28)*	–.74*	.68	(28)*	–.01	.38	(14)	–.81*	.71	(28)*	–.80*	.71	(28)*
80							–.75*	.75	(9)*	–.49	.08	(9)				–.89*	–.21	(9)	–.47	.31	(9)
89							–.75*	.20	(5)	–.42	.42	(6)				–.14	.90	(5)*	–.88*	.60	(5)
99	–.67*	.61	(7)*	.65*	.86	(9)*	–.80*	.58	(10)*	–.80*	.18	(10)	–.10	.20	(8)	–.73*	.83	(10)*	–.38	.81	(10)*

[a] N gives the number of firms in each category. In every case there are an equal number of firms in the below- and above-target categories.

* $p < .05$

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IMPROVING PREDICTIONS IN EXPECTANCY THEORY RESEARCH: EFFECTS OF PERSONALITY, EXPECTANCIES, AND NORMS

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This study tested Fishbein and Ajzen's hypothesis that the behavior of some individuals will be rationally determined by personal expectancies and that the behavior of other individuals will be environmentally determined by social norms. As predicted, strong expectancy-behavior correspondence was obtained for individuals who were dispositionally aware of personal expectancies but unattuned to social norms. In contrast, we predicted and obtained strong norm-behavior correspondence for individuals who were dispositionally attuned to social norms but unaware of personal expectancies. Several methodological refinements in expectancy measures produced equivalent results.

Different versions of expectancy theory share the postulate that individuals are motivated to engage in behaviors to the extent that they expect those behaviors to result in positive outcomes. Expectancy theory has been applied to the analysis of a wide array of phenomena, including social attitudes, decision-making processes, and causal attributions (Feather, 1982). In particular, the theory has had a pervasive influence on organizational research, having been used to explain occupational preference, job satisfaction, and work motivation (Mitchell, 1982). This widespread use has continued even though expectancy measures have typically accounted for only 10 percent of the variance in overt behaviors (Campbell & Pritchard, 1976; Kopelman, 1977; Mitchell, 1974; Wahba & House, 1974).

When a theory performs poorly, two basic strategies can be adopted to increase its scientific utility (Popper, 1959). One strategy is to refine the theory by, for example, including additional variables or narrowing the conditions under which it will apply. Another strategy is to develop better operational measures of the constructs that are essential to the theory. To some extent, investigators have pursued both strategies by proposing conceptual and methodological refinements of expectancy theory (Mitchell, 1982). We conducted the present investigation to determine whether a number of those refinements actually improve behavioral prediction.

REFINEMENTS OF EXPECTANCY THEORY

Conceptual Refinements

Early expectancy theories implied that the behavior of all individuals was rationally determined by the perceived likelihoods and desirabilities of outcomes associated with various behaviors (Vroom, 1964). Recently, investigators have explicitly acknowledged that expectancy theory may not be applicable to all individuals or in all situations (Mitchell, 1982). In general, theorists have noted that forces in an environment as well as factors within an individual may be important determinants of behavior (Magnusson & Endler, 1977).

Fishbein and Ajzen's theory of reasoned action (1975; Ajzen & Fishbein, 1980) represents an extension of expectancy theory that incorporates both environmental forces and individual differences. As in other expectancy theories, in this model motivation is a function of individuals' attitudes resulting from their expectations regarding the potential consequences of a given behavior. Unlike other expectancy theories, however, in this model individuals' perceptions of social norms in their environment can also motivate behavior and do so independently of attitudes. Additionally, in this model other factors, such as personality characteristics, affect behavior indirectly by influencing either scores on attitude and norm measures or the weights attached to those measures in the prediction of behavior.

Considerable research has shown that attitudes and norms jointly account for significant portions of the variance in many behaviors (Ajzen & Fishbein, 1973), and that other factors, such as personality traits (Zanna, Olson, & Fazio, 1980) and prior experience (Fazio & Zanna, 1978), influence behavior indirectly through their effects on attitudes or norms. Comparatively little research, however, has investigated individual differences in the relative importance of both attitudes and norms for determining behavior. Discussing the relative importance of these factors, Snyder and Kendzierski (1982) argued that attitudes will guide behavior only if people are aware of their beliefs and see them, rather than situational influences, as relevant guides to their actions.

From the perspective of Fishbein and Ajzen's model, then, attitudes should correspond most highly with behavior for individuals who are attuned to their personal expectancies regarding behavioral consequences but unattuned to the social norms in their environment. Conversely, norms should correspond most highly with behavior for individuals who are attuned to social norms but unattuned to their personal expectancies.[1]

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[1] Fishbein and Ajzen (1975: 30–32) viewed attitudes and expectancies as interchangeable constructs because their operational measures are highly similar. In their model, the perceived likelihood of a behavioral consequence, or a belief, is multiplied by the perceived evaluation of that consequence, the affect, with the cross-products of all consequences summed to create an overall attitude index. In research on expectancy theory (Mitchell, 1974), the perceived likelihood of a behavioral consequence, the expectancy, is multiplied by the perceived desirability of that consequence, or the valence, with the cross-products of all consequences summed to create an overall expectancy index.

To test these theoretical assertions regarding individual differences, the present study examined the effects of two personality characteristics: private self-consciousness and self-monitoring. Private self-consciousness refers to the degree to which individuals are aware of their own beliefs (Fenigstein, Scheier, & Buss, 1975) and disposed to use them as guides for their behavior (Carver & Scheier, 1981). The level of private self-consciousness, however, does not indicate the extent to which individuals will be responsive to the social norms in their environment. Consequently, we also studied the characteristic of self-monitoring because it refers to the degree to which individuals are attuned to social norms (Snyder, 1974) and disposed to use them to guide their own behavior (Snyder & Monson, 1975).

Our major hypothesis was that individuals who are both high in private self-consciousness and low in self-monitoring would display high correspondence between expectancies and behavior but low correspondence between norms and behavior. In contrast, individuals who are low in private self-consciousness and high in self-monitoring were expected to show low correspondence between expectancies and behavior but high correspondence between norms and behavior.

No firm hypotheses were tested for individuals who were high or who were low on both personality dimensions because several outcomes were theoretically possible. For example, if high private self-consciousness and low self-monitoring are both necessary for correspondence between expectancies and behavior (Scheier, 1980; Snyder & Kendzierski, 1982), individuals who are high or who are low on both personality dimensions should show low expectancy-behavior correspondence. At the same time, they should show high norm-behavior correspondence if, as Ajzen and Fishbein (1980) argued, behaviors are controlled by norms when they are not controlled by expectancies. Alternatively, if awareness of personal expectancies alone is sufficient for high correspondence between expectancies and behavior and attunement to social norms alone is sufficient for high norm-behavior correspondence, individuals who are high on both personality dimensions should show both high expectancy-behavior correspondence and high norm-behavior correspondence. By the same reasoning, individuals who are low on both personality dimensions should show both low expectancy-behavior correspondence and low norm-behavior correspondence.

Methodological Refinements

In research on expectancy theory, respondents are generally asked to rate expectancies and valences for a list of outcomes provided by an investigator. Researchers typically measure expectancies as ratings of the likelihoods that a generalized act (e.g., working hard) will lead to various outcomes. Valences are usually measured as ratings of the desirabilities of the outcomes. Researchers then create an overall expectancy index by simply summing the cross-products of the likelihood and valence ratings for all the outcomes (Mitchell, 1974).[2]

To investigate several methodological refinements of this standard expectancy index, we compared three alternative expectancy indices. A *sample-selected outcome index* was based on all those outcomes selected as important by a sample of respondents (Fishbein & Ajzen, 1975). An *individually selected outcome index* was based on only those outcomes selected as important by each respondent (Eiser & Van der Pligt, 1979). A *factor score index* was created by differentially weighting expectancy-valence cross-products to reflect their correspondence to the underlying factor structure (Dillard, 1979).

Although the three indices compared in this study shared several features, they were distinct from one another both conceptually and empirically. For example, although sample-selected and individually selected outcomes should produce comparable results if the outcomes that motivate behavior are similar across individuals, individually selected outcomes should produce higher behavioral correspondence if the motivating outcomes differ across individuals. Additionally, the use of factor scores should produce better results than the other measures if the various outcomes differentially tap underlying dimensions that influence behavior.

METHODS

Respondents

The respondents were 226 full-time students enrolled in introductory psychology classes who received extra course credit for their participation. Students met in groups ranging in size from 6 to 27 for administration of questionnaires. Sixteen individuals failed to respond to one or more items, but they were retained despite the missing data, so group sizes varied slightly in the different analyses we performed. We did not use the data for two other individuals because they failed to complete one of the personality scales and could not be classified on that dimension.

Data Collection

Students first completed the personality scales, which were introduced under the pretext of being part of a research project on test construction that was being conducted by another investigator. Questionnaires were then administered to assess expectancies, perceived norms, and behavior with respect to spending time on school work. Because we developed the questionnaires specifically for this study, they are described in complete detail in the Appendix.

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[2] Although many expectancy researchers have used a three-component model including expectancies, instrumentalities, and valences, the two-component approach described here has been found to account for more variability in criterion measures (Schwab, Olian-Gottlieb, & Heneman, 1979).

Measures

Personality. Fenigstein and colleagues' (1975) Private Self-Consciousness Scale and Snyder's (1974) Self-Monitoring Scale were administered to assess self-consciousness and self-monitoring. Although some researchers have argued that overall self-monitoring scores should not be used because the Snyder scale is multidimensional (Briggs & Cheek, 1986), Snyder and Gangestad (1986) presented clear evidence that the overall score is meaningful and should be the basis for research on this construct. Consequently, we used scores based on responses to the entire scale.

Expectancies. The expectancy questionnaire asked students to provide several ratings of 13 potential outcomes of spending time on school work. The 13 outcomes were selected from a preliminary study that we conducted in which a random sample of college students indicated that those particular consequences were the most important ones for spending time on school work. The outcomes included both positive ones, such as learning interesting things, and negative ones, such as having less time for leisure activities.

For each outcome, the students rated its valence, its importance, its likelihood with 10 hours of work each week, and its likelihood with 30 hours of work each week. All ratings were made on 7-point scales. We used the two sets of likelihood ratings to calculate return-on-effort measures (Kennedy, Fossum, & White, 1983; Kopelman, 1977; Kopelman, Liebman, & Yukl, 1978). Specifically, return-on-effort was defined as the likelihood of an outcome's occurring with 30 hours of work each week minus the likelihood of its occurring with 10 hours of work.

Likelihood-valence cross-products were obtained by multiplying the return-on-effort likelihood measure for each outcome by its corresponding valence rating. We then used the cross-products to construct three different expectancy indices. Specifically, we constructed a sample-selected outcome index by summing the cross-products for all 13 outcomes chosen by the preliminary sample of students. We constructed an individually selected outcome index by averaging the cross-products for only those outcomes that each individual had rated as highly important, as indicated by a rating of 6 or 7 on the 7-point importance scale. Finally, we obtained a factor score index by combining factor scores extracted from principal axis factor analysis and varimax rotation of the 13 cross-products.[3]

Norms. The norm questionnaire measured social normative beliefs regarding four reference groups: closest friends, acquaintances other than closest friends, family members, and instructors. We chose those particular reference groups because students in the preliminary study indicated that those groups exerted the greatest influence on their study habits.

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[3] The factor analysis produced three distinct factors for the 13 outcomes of spending time on school work: (1) immediate but intangible benefits, such as learning interesting things; (2) immediate and tangible costs, such as spending less time with friends; and (3) remote but tangible benefits, such as getting a good job after school. Detailed information concerning the factor structure and the statistical methods employed to create the factor score index is available from the first author.

The questionnaire items asked respondents to select from seven choices their best estimate of how many hours per week each reference group thought they should spend on academic activities. The choices ranged from 1 (10 or fewer hours) to 7 (more than 40 hours). The measure of perceived social norms was then defined as the sum of the normative belief ratings for the four reference groups.

Behaviors. The behavior questionnaire asked students to estimate the extent to which they engaged in eight academic activities during the semester. The activities included such things as reading the assignments before lectures, reviewing lecture notes after class, and using available study guides. Seven of the behavior items had multiple choice formats that required students to indicate how frequently they engaged in each activity. We coded responses to these items from 1 to 4, with higher scores indicating that more time was spent on the activity. An eighth item required the students to give a quantitative estimate of the average number of hours they spent each week on academic activities outside of classes.

Multiple behavior items are typically combined into an overall index by equally weighting each item relative to every other item (Epstein, 1979). Such arbitrary weighting, however, will lead to underestimation of the degree of correspondence between behavior and other variables when some behaviors are more readily predictable than others. In the present study, therefore, we used multiple regression techniques to ensure that each behavior item would be appropriately weighted in determining the correspondence between behavior and expectancies as well as between behavior and norms. Specifically, we treated the eight behavior items as the independent variables and either the expectancy or norm index as the dependent variable. The resulting multiple correlation coefficient provided a summary statistic of the degree of correspondence between the behavior items and the expectancy or norm index.

Personality Groups

Median splits of scores on the Private Self-Consciousness (median = 23.0) and Self-Monitoring (median = 13.0) scales were used to partition the students into four groups on the basis of their combinations of high or low self-consciousness and high or low self-monitoring scores.

RESULTS

Preliminary Analyses

Intercorrelations among the various measures were first obtained to provide some check on the study's underlying assumptions. Table 1 presents the means, standard deviations, and intercorrelations for the two personality measures, the three expectancy indices, the measure of perceived social norms, and the eight behavior items.

TABLE 1
Means, Standard Deviations, and Intercorrelations for All Variables[a]

Measures	Means	s.d	1	2	3	4	5	6	7	8	9	10	11	12	13
Personality measures															
1. Private self-consciousness	23.4	5.0													
2. Self-monitoring	12.4	4.0	17												
Expectancy indices															
3. Sample-selected outcomes	31.7	37.0	15	−02											
4. Individually selected outcomes	4.2	4.1	15	−07	85										
5. Factor scores	0.0	1.0	20	00	90	82									
Social norm index															
6. Perceived social norms	13.6	4.1	−01	−11	29	32	31								
Behavior measures															
7. Read assignments for exams	3.4	0.6	12	04	19	16	16	02							
8. Take notes on readings	3.1	0.9	00	−13	16	10	15	12	31						
9. Study notes for exams	3.6	0.7	10	05	13	09	13	03	26	23					
10. Use study guides	3.1	0.9	05	08	08	02	08	02	21	14	15				
11. Practice math problems	3.0	0.9	10	10	19	16	20	15	17	23	10	10			
12. Review notes before lectures	1.6	0.8	07	01	18	14	19	15	13	27	17	15	24		
13. Read assignments before lectures	2.2	0.8	06	04	01	02	−03	05	31	18	17	11	16	26	
14. Time spent studying	18.8	7.8	09	−11	36	41	38	50	26	27	14	17	28	33	30

[a] Decimal points are omitted for correlations. Because of missing data, *N*s ranged from 215 to 226 for the analyses in this table.

The correlational findings in Table 1 have three major implications. First, the extremely low correlations between personality and other scores ($\bar{r} = .08$) suggest that the use of median splits to create the four personality groups did not introduce bias in tests of the principal hypothesis. Bias would occur if, for example, extreme personality scores were systematically related to extreme scores on the expectancy, norm, or behavior measures (Bem & Allen, 1974). Second, the moderately low correlations between the expectancy and norm indices ($\bar{r} = .31$) suggest that personal expectancies and social norms were substantially independent of one another and could therefore differentially mediate the behavior of different individuals. Third, the relatively low intercorrelations among the eight behavior items ($\bar{r} = .21$) suggest that it might be inappropriate to construct a composite behavior measure by simply weighting each item equally in an overall index, as is often done in expectancy research.

Table 1 also shows that the three expectancy indices were highly correlated among themselves ($\bar{r} = .86$), a finding that is not surprising, because all three measures were constructed from a common pool of likelihood-valence cross-products. The high correlations do not, however, conclusively demonstrate that all three indices will be equally effective in predicting behavior. To select the best index, we first randomly divided all the respondents into two groups to obtain statistically independent measures of expectancies. We then correlated each of the three expectancy measures with the set of eight behavior measures for each subgroup separately. Fisher's r-to-z transformation tests indicated that none of the three correlations obtained from the first subgroup differed significantly from any of the three correlations obtained from the second subgroup ($p > .30$ for all comparisons).[4] Given the statistical equivalence of the three indices, we used the sample-selected outcome index in the principal analyses because it is similar to indices used in previous studies (Davidson & Jaccard, 1979; Kopelman, 1977).

Principal Analyses

Multiple regression analyses were conducted to test for individual differences in expectancy-behavior and norm-behavior correspondence. In these analyses, we treated the eight behavior measures as independent variables on which we based predictions of expectancy and norm scores for each of the four personality groups.

Table 2 presents the results of the analyses. We evaluated our principal hypothesis by comparing the R^2 values for the expectancy-behavior and norm-behavior correspondences for the group high in private self-consciousness and low in self-monitoring and for the group low in private self-consciousness and high in self-monitoring.

As predicted, correspondence between expectancies and behavior was significant for the group high in self-consciousness and low in self-monitoring, whereas norm-behavior correspondence was not significant. Moreover, 40

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[4] Detailed descriptions of these analyses and results are available from the first author.

TABLE 2
Expectancy-Behavior and Norm-Behavior Relationships

Relationships	R^2 High Self-consciousness-Low Self-monitoring (N = 44)	Low Self-consciousness-High Self-monitoring (N = 50)	High Self-consciousness-High Self-monitoring (N = 60)	Low Self-consciousness-Low Self-monitoring (N = 59)
Expectancy-behavior	.40*	.28	.23	.22
Norm-behavior	.20	.50**	.33**	.42**
Expectancy (norm)-behavior[a]	.37*	.19	.22	.15
Norm (expectancy)-behavior[a]	.18	.44**	.31*	.35**

[a] The variables in parentheses have been partialled out of the relationships.

*$p < .05$

**$p < .01$

percent of the variance in expectancy scores was shared in common with the behavior scores of these respondents, but only 20 percent of the variance in norm scores was shared in common with behavior. Also as expected, norm-behavior correspondence was significant for the group low in self-consciousness and high in self-monitoring, whereas expectancy-behavior correspondence was not. Moreover, 50 percent of the variance in norms was shared in common with behavior for that group, but expectancy scores shared only 28 percent of their variance with behavior.

Table 2 also presents the results for the groups that were either high in both personality traits or low in both traits. For those two groups, norm-behavior correspondence was significant, and expectancy-behavior correspondence was not. On the average, norm scores shared 38 percent of their variance in common with behavior for the two personality groups, and expectancy scores shared only an average of 23 percent of the variance.

The analyses were conducted in a manner that was generally parallel to methods frequently reported in the literature (Carver & Scheier, 1981; Scheier, 1980; Snyder & Kendzierski, 1982). Nevertheless, our analyses may be problematic because the moderate correlations between the scores for norms and expectancies reported in Table 1 may contaminate the expectancy-behavior and norm-behavior correspondences reported in Table 2. To provide more stringent tests of the hypotheses, therefore, we performed multiple semipartial correlation analyses for each personality group. To assess the correspondence between expectancies and behavior, for example, we first used norm scores as the independent variable in a regression equation to predict expectancy scores and obtained the residual expectancy scores from this analysis. We then used the eight behavior scores as the independent variables in a multiple regression analysis to predict the residual expectancy scores. To assess norm-behavior correspondence, we conducted similar analyses to partial out the effects of expectancies from norms.

Table 2 also reports the results of these more rigorous tests of the principal hypothesis. The same pattern of results emerged again. For individuals high in self-consciousness and low in self-monitoring, expectancy-behavior correspondence was significant and high, and norm-behavior correspondence was nonsignificant and low. We obtained opposite results for the other three personality groups: expectancy-behavior correspondence was nonsignificant and low for these groups, and norm-behavior correspondence was significant and high.

DISCUSSION

This study was primarily designed to test the hypothesis that personal expectancies will determine the behavior of some individuals and that perceptions of social norms will determine the behavior of others. As predicted, individuals who were both dispositionally aware of their own expectancies and unattuned to the expectations of others showed high expectancy-behavior and low norm-behavior correspondence. Also as predicted, individuals who were dispositionally unaware of their expectancies but highly attuned to the expectations of others displayed high norm-behavior and low expectancy-behavior correspondence. Finally, individuals with other personality profiles displayed high norm-behavior and low expectancy-behavior correspondence (see Table 2).

These personality findings represent a significant extension of existing research on the separate effects of either self-consciousness (Carver & Scheier, 1981) or self-monitoring (Ajzen, Timko, & White, 1982; Snyder & Kendzierski, 1982) on the relationships of expectancies to behavior. The present results strongly suggest that the joint effect of both these personality traits is necessary to provide an adequate account of who will and who will not show correspondence between expectancies and behavior. The finding that expectancies had strong correspondence with self-reported behavior only for individuals both high in private self-consciousness and low in self-monitoring provides evidence for a joint effect. The weak and nonsignificant correspondence for individuals either high in both traits or low in both indicates that neither high private self-consciousness nor low self-monitoring alone is sufficient to produce expectancy-behavior correspondence.

The results reported here also overcome a potential problem associated with earlier studies of the moderating role of dispositional variables on the relationship between expectancies and behavior. Research suggesting that expectancies will predict the behavior of only some individuals has tended to imply that the behavior of most individuals is randomly or irrationally determined (Carver & Scheier, 1981; Snyder & Kendzierski, 1982). In contrast, the present results clearly suggest that many individuals turn to others as a source of information about how to act rather than use their own expectancies as guides for behavior. More specifically, perceptions of social norms correspond highly with the self-reported behavior of individuals who failed to satisfy the necessary conditions of being both high in private self-consciousness and low in self-monitoring. A major contribution of the present study is that it not only helps to establish the conditions under which expectancies determine behavior but also demonstrates that social norms may determine behavior when those conditions are not met.

A secondary purpose of this study was to compare various methodological refinements against one another. The absence of empirical differences among the indices suggests that Fishbein and Ajzen's (1975) use of sample-selected outcomes may have adequately solved the problems that approaches based on individually selected outcomes and factor scores were designed to address. If only the outcomes that a representative sample of individuals considers to be important are included, outcomes that are trivial for most individuals are presumably excluded. In addition, if only the most important outcomes are included in the overall attitude index, equal weighting of the outcomes can be as good as empirical weighting (Dawes & Corrigan, 1974).[5]

Implications

The present results suggest that rational choice based on expected consequences characterizes the behavior of only some individuals. Conceptually, our findings are important because they help to set the boundary conditions of expectancy theory (Mitchell, 1982). Heuristically, findings like these are important because they can stimulate further attempts to identify other conditions limiting expectancy theory. Future research could determine, for example, whether individuals with a strong internal locus of control (Rotter, 1966) or a highly instrumental task-orientation (Moreland, Gulanick, Montague, & Harren, 1978) are more disposed to act on personal expectancies than individuals with an external focus or expressive orientation. In addition, other research could seek to identify domains in which expectancies might be irrelevant because enduring habits rather than rational choices determine behaviors (Triandis, Vassiliou, Vassiliou, Tanaka, & Shanmugen, 1972).

Although the results reported here narrow the scope of traditional expectancy theories, the finding that social norms were an important determinant of behavior also provides some impetus for the expansion of refined expectancy theories. By asking respondents to provide subjective perceptions of how various reference groups expected them to behave, we operationally defined social norms in essentially the same terms as traditional expectancy measures. Despite the operational similarities, however, personal expectancies and social norms functioned differently in determining the behaviors of different individuals. Thus, investigators could comfortably revise expectancy theories to include measures of social norms as well as personal expectancies (Ajzen & Fishbein, 1980).

The fact that their perceptions of social norms determined the behavior of most individuals in this study also has practical implications for the use of persuasive techniques to change behavior. For example, managers are frequently taught to motivate employees by strengthening their perceptions that various incentives are contingent upon increased productivity (e.g., Lawler, 1981). To the extent that our findings regarding the studying behavior of students can be generalized to the work behavior of employees, however, persuasive attempts to change expectancies might effectively alter the behavior of only a small minority of workers.

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[5] Although using individually selected outcomes and factor scores did not improve behavioral prediction in this study, they might prove useful in other settings. When time constraints preclude initial testing to identify the most important outcomes, for example, investigator-generated lists of outcomes can be individually refined to improve results and management decisions based upon them (Eiser & Van der Pligt, 1979). In contrast, when the goals of research are to understand the fundamental nature of expectancies, factor analysis can be a useful diagnostic tool to identify the underlying structure of expectancies (Gabrenya & Biddle, 1982).

An alternative strategy for increasing employees' motivation would be to implement programs that not only raise workers' expectations for positive outcomes but also increase the weight that they place on their expectancies. In this regard, research has identified some situational conditions that enhance private self-consciousness and can thereby strengthen the impact that expectancies have on behavior. Specifically, manipulations like having people engage in a behavior in the presence of a mirror (Wicklund, 1982) or having them spend time thinking about their personal beliefs that are relevant to a behavior (Snyder & Kendzierski, 1982) have been shown to increase the association between expectancies and behaviors in laboratory settings. Future research will be needed to determine whether such strategies are equally effective in work organizations.

A second strategy for increasing employees' motivation would be to change workgroup norms. Although many organizations appear to have corporate cultures that resist changes in the way things are done (Moch & Seashore, 1981), some laboratory evidence shows that social norms can be altered and that such changes can lead to correspondent changes in behavior (Ajzen, 1971). More field research on social norms is needed, however, if motivational processes in organizations are to be better understood and more effectively managed. Certainly, the literature on organizations already contains theoretical accounts and descriptive studies of how norms can be communicated formally through management directives or transmitted informally through organizational stories, rituals, and scripts (Martin, 1981; Trice & Beyer, 1984). Unfortunately, quantitative analyses in this area have lagged behind qualitative ones, perhaps in part because sound measures of organizational norms have not been readily available (Feldman, 1984: 52). We hope the present study will help to alleviate this problem by showing that social norms can be measured empirically in the same subjective terms as personal expectancies.

CONCLUSIONS

The popularity of expectancy theory can be attributed to the logical appeal of its underlying assumption that the perceived consequences of actions rationally determine human behavior. As evidence has mounted to challenge that assumption, however, some writers have suggested that concepts like expectancies and attitudes should be abandoned completely (Abelson, 1972). In contrast, the results of the present study demonstrated that conceptual advances can be made in expectancy theory by including additional variables or by identifying the theory's limiting conditions (Magnusson & Endler, 1977; Mitchell, 1982). More important, the present results suggest that expectancy theory should be revised to view humans as *social* as well as *rational* beings. Although people weigh the personal consequences of their actions, they also take into account what significant others expect them to do. From that perspective, individuals merely differ in their predispositions to attach more weight to the personal consequences of their actions or to the social norms in their environments.

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APPENDIX

Expectancy questionnaire. The 13 outcomes that were rated were: (1) I will get good grades, (2) I will be bored by the work, (3) I will get a good job after graduation, (4) I will obtain praise from my parents, (5) I will gain admission to graduate, medical, or other professional school, (6) I will gain the respect of my instructors, (7) I will miss out on social activities, (8) I will miss out on spending time with my close friends, (9) I will have less time for leisure activities I enjoy, such as hobbies and sports, (10) I will develop feelings of accomplishment, (11) I will develop self-esteem, (12) I will learn interesting things, and (13) I will gain the respect of my peers.

Valences of the 13 outcomes were rated on scales anchored "very undesirable" = −3 and "very desirable" = +3. Importance ratings were made on scales anchored "very unimportant" = 1 and "very important" = 7. Likelihood ratings were made on scales anchored "very unlikely with 10 (or 30) hours of work" = 1 and "very likely with 10 (or 30) hours of work" = 7.

Norm questionnaire. The social normative beliefs regarding each of the four reference groups were measured by items of the following form, with responses coded from 1 to 7: the number of hours my closest friends think that I should spend outside of classes on academic activities each week is (a) 10 or fewer hours, (b) 11–16 hours, (c) 17–22 hours, (d) 23–28 hours, (e) 29–34 hours, (f) 35–40 hours, (g) more than 40 hours.

Behavior questionnaire. The seven behavior items with multiple-choice response scales were: (1) Before I have taken exams this semester, I have usually (a) not read the assigned readings, (b) skimmed the assigned readings, (c) read most of the assigned readings, (d) read all of the assigned readings; (2) Before I have taken exams this semester, I have outlined or taken notes on assigned readings (this does not include underlining important ideas) (a) never, (b) almost never, (c) sometimes, (d) very often; (3) Before I have taken exams this semester, I have generally (a) not studied my lecture notes, (b) skimmed my lecture notes, (c) read my lecture notes once, (d) read my lecture notes more than once; (4) I have used study guides available for my courses this semester (a) never, (b) almost never, (c) sometimes, (d) very often; (5) For math courses this semester, I have (a) almost never practiced solving problems, (b) sometimes practiced solving problems, (c) often practiced solving problems, (d) practiced solving almost all of the problems provided by the text and instructor; (6) Before attending lectures this semester, I have reviewed class notes from previous lectures (a) almost never, (b) sometimes, (c) often, (d) almost always; and (7) This semester, before my instructors have lectured on topics, I have generally (a) not read the relevant assigned readings, (b) read some of the relevant assigned readings, (c) read most of the relevant assigned readings, (d) read all of the relevant assigned readings. The four possible responses for each item were coded from 1 to 4.

The eighth behavior item was: The average number of hours I have spent outside of classes each week this semester on academic activities (including studying, working on projects, writing papers, working math problems, etc.) is _______ hours per week.

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PROCESS-ORIENTED PRODUCTION PLANNING AND CONTROL: FACTORS THAT INFLUENCE SYSTEM DESIGN

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This research describes how five production planning and control functions are accomplished by successful information systems in process industries, identifies factors that influence the design of the systems that support these functions, and models the relationships between influential factors and planning and control systems. A case study methodology, using previsit questionnaires and on-site interviews, was used to collect detailed information in six firms on how their repeatedly successful production planning and control functions were accomplished and to identify factors that influenced their choice of specific methods. These data were summarized and relationships between planning and control functions and influential factors were identified graphically. Nineteen implications summarize relationships and provide specific directions for future research.

Although process industries represent over 50 percent of U.S. manufacturers (Novitsky, 1983), they have not received a great deal of research attention. Process manufacturing has been defined as production that adds value by mixing, separating, or forming substances or by using chemical reactions (American Production and Inventory Control Society, 1987). This study was designed to identify the methods process-oriented firms use to accomplish planning and control functions, the factors that influenced their selection of those methods, and the relationships between the influential factors and planning and control systems.

This study had three purposes. The first was to determine how five major planning and control functions are accomplished in successful planning and control systems. The second was to determine what environmental factors influenced the designing of successful management information systems to support those functions. The third was to construct a model of the

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relationships between the influential factors and the designs of the planning and control systems studied. We conducted detailed case studies in six firms to identify the methods used, the influential factors, and the relationships.

This study is the first step toward a prescriptive model of the design of planning and control systems. In addition to providing that first step, identifying factors that influence the design of planning and control systems also isolates important, relevant variables. Several authors have stressed the importance of developing realistic models. Buffa (1980) criticized research in operations management for developing models of restricted scope. Kaplan (1983) stated that the managers of a select group of firms have more knowledge about effective operations management than is available to scholars. Silver (1981) suggested increased emphasis on realistic problem formulation and stated that more research should be directed to real problems and less to theoretical ones.

PRODUCTION PLANNING AND CONTROL FUNCTIONS

Progress in research on production planning and control has resulted in the formation of categories describing various types of manufacturing operations. Some researchers (Meredith & Gibbs, 1980; Tersine, 1982) have classified manufacturing firms in terms of volume of product. "Project manufacturers" produce very low volumes of unique items, "intermittent manufacturers" produce low volumes of similar items or batches of items, and "continuous manufacturers" produce high volumes. Other researchers (Dilworth, 1986; Schmenner, 1984) have referred to "repetitive manufacturers" and "job shops." Repetitive manufacturers are high volume producers of discrete products and job shops are intermittent producers of discrete products. Schmenner (1984) and Greene (1970) also categorized some firms as "process industries," those that do not make products in discrete units. Their products are often in a liquid or powdered form at some stage of production (American Production and Inventory Control Society, 1987). The packaging stage, often the last step in production, defines the units to be marketed. Process industries are quite often mistakenly assumed to have a continuous flow of products. In reality, process industries, like discrete product industries, can range in volume of product from project to continuous manufacturing.[1]

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[1] There are two common generalizations concerning process industries. First, they are often assumed to be continuous manufacturers. In reality, most are batch-oriented, and some project-oriented process industries exist. Second, it is often thought that process manufacturers produce no discrete products. On the contrary, virtually all manufactured products become discrete at some point, even if it isn't until packaging for the consumer. Most involve production steps like conversion, fabrication, or assembly, before they are ready for consumers. Some process manufacturers accomplish only the process-oriented steps, and others perform conversion, fabrication, or assembly steps as well. The fact that a firm is involved in discrete product manufacturing as well as process manufacturing does not mean it is not a process manufacturer. It merely means that it is vertically integrated.

Buffa and Miller (1979) described the relationships between the production planning and control systems and the physical production systems. Planning and control systems are used "to guide and coordinate the flow of materials and labor inputs and goods and services outputs through the physical [production] system" (1979: 3–4). Although production planning and control functions are often intertwined and difficult to separate, they are relatively easily understood if they are described separately (Fogarty & Hoffman, 1983).

Firms must plan and control priorities and capacities, two components of physical systems (Plossl & Wight, 1971; Vollmann, Berry, & Whybark, 1984). Planning and controlling priorities ensures that products are completed when promised, and planning and controlling capacities ensures that the labor and equipment available can meet the completion dates. Two types of priorities exist. Independent demand priorities establish due dates for end-items that are based on market demand. Dependent demand due dates, priorities for component parts, are established by the priority for an independent demand item. An additional function, demand management, consists of forecasting, entering orders, and aggregate production planning. Demand management is frequently accomplished within a firm's marketing function and is often centralized. Because the function is not completely accomplished within production at the plant level, we did not include it in this study. Demand management is a prerequisite to master production scheduling, which establishes the priorities of independent demand items. Firms typically perform priority planning and capacity planning for dependent items next, and then accomplish priority control and capacity control while plans are being executed. That is the typical sequence for these functions, and we addressed them in this study in the same sequence.

The selection of a value for a parameter associated with functions within a planning and control system is known as a "critical design decision" (Orlicky, 1985: 158). Orlicky identified several examples of critical design decisions. They include the length of the planning horizon, the length of the production time period—called the time bucket—the coverage of inventory by class, the frequency of replanning, the traceability of requirements, and the capability to freeze planned orders (Orlicky, 1975: 156). Firms must make many other decisions when designing planning and control systems. Researchers have not, however, identified factors that influence how those decisions should be made, nor have they identified the relationships between existing influential factors and design decisions.

PREVIOUS RESEARCH

Research relating to planning and control in process industries is scarce. Several researchers (Bolander & Taylor, 1982; Cooper, 1985; George, 1985; Kiekhaefer & Williams, 1982; Novitsky, 1984; Smith, 1985) have identified characteristics common to process industries. We expected those characteristics, which are summarized in Table 1, to influence the design of planning and control systems. Most research in this area consists of anecdotes on how one company deals with specific planning and control functions. Bolander, Heard, Seward, and Taylor (1981) summarized planning and control issues in process industries. In their study, representatives from several process-oriented firms identified the requisite components of a comprehensive production planning and control system. The resulting prescriptive model contained the modules necessary to describe a composite of the systems of all participating firms.

An extensive review of the literature concerning production planning and control systems in both process and discrete-product manufacturing resulted in the identification of many possible influential factors. Bolander and coauthors presented the most extensive list relating to process industries (1981: 5); Table 2 reproduces that list. However, they identified neither the specific function within a planning and control system each factor influences nor the actual effects of the particular factors. Those authors also provided a list of design considerations for master production scheduling, material planning, and material control but did not examine the linkage between influential factors and design considerations.

Wemmerlov (1979) presented 14 material requirements planning (MRP) system design factors based on the MRP systems of 13 firms. Wemmerlov studied only MRP systems, which are production planning and control systems that include master scheduling and various levels of capacity planning and use the MRP technique to determine priorities for manufactured or purchased component parts. The MRP technique is a method of exploding an end-item into its components, computing net requirements for each one, and backward scheduling from the end-item's due date to determine components' due dates. A company can use the MRP technique without having an MRP system or an MRP system can be in place but the MRP technique only be used in certain areas of a plant or only for computing due dates for purchased components.

TABLE 1
General Characteristics Exhibited by Process Manufacturers

Variability of raw material quality is great.
Need to adjust bills of material depends on raw material consistency.
Product yield variability depends on raw materials.
Demand for intermediate products may be significant.
Balance of coproducts is important.
Products and raw materials may have short shelf lives.
Fixed routings are common.
Lead time to increase capacity is characteristically long.
Aggregate capacity depends on product mix and is difficult to define.
Little work-in-process inventory exists.
Production is capital intensive rather than labor intensive.
There is a high priority for preventive maintenance.
Lack of decoupling requires prompt material deliveries.
Production 24 hours per day is common.

Note: Adapted from Bolander, Heard, Seward, and Taylor (1981: 5).

TABLE 2
Factors That Affect the Design of Production Planning and Control Systems

Sales volume
Number of customers
Yield variability
Reliability of equipment
Number of finished, intermediate, and raw materials
Make-to-stock, make-to-order, missed orders
Customer order lead times
Number of plants and production lines
Number of distribution centers
Number of intermediate stocking points
Shipping cost for alternate quantities and delivery times
Cost of increasing or decreasing production rate
Set-up cost associated with switching products
Existence of a natural scheduling sequence
Ability to subcontract
Personnel policies (hiring, firing, overtime, etc.)
Lead time for increasing capacity
Seasonal demand patterns
Supplier reliability
Strike potential
Bill of material variability

Note: Adapted from Bolander, Heard, Seward, and Taylor (1981: 5).

Unlike Wemmerlov, we examined a broad range of planning and control systems. Some used MRP systems, some used the MRP technique, and some used neither. This study also identified factors that influence the design of planning and control systems and relationships between influential factors and design decisions. Wemmerlov did not identify any factors or relationships. Indeed, no previous study has examined environmental, plant, and product characteristics and their effects on the development of planning and control systems.

RESEARCH METHODS

This study was, by necessity, exploratory. The development of a model of relationships between influential factors and the design of planning and control systems is an initial step in the development of production planning and control theory. We therefore used a case study methodology (Schendel & Hofer, 1979).

In recent years, model building and management research have received significant negative criticism (Buffa, 1980; Lilien, 1975; Richels, 1981; Urban, 1974). A problem with some models is that they do not accurately represent real-life situations. As was mentioned, Buffa stressed a need for strong relationships between research models and the world of practitioners. His logic suggested that the best way to build our prescriptive model was to base it on existing, reportedly successful planning and control systems. Three steps were needed: (1) develop a descriptive model of the relationships, (2) validate it, and (3) determine if performance measures support the relationships presented in the descriptive model. In other words, our method was to determine what is being done and then to determine if that is the way it should be done.

Site Selection

Potential participants in the study were identified in three ways. First, we published a request for contact from firms with successful planning and control systems in the newsletter of the American Production and Inventory Control Society (APICS) Process Industry Special Interest Group, which has 500 members. Second, consultants who specialized in process-industry planning and control systems were asked to identify process-oriented firms that had well-designed planning and control systems. Third, we performed a literature review to identify firms that had been recognized as having good planning and control systems. All research took place in 1986.

Three criteria were used for selecting plants for case studies. First, a plant had to be process-oriented. Second, we wanted a diversity among the plants in terms of the source of demand information and the volume of product. Sources of demand information could range widely; a firm with 100 percent make-to-stock production would present one extreme, and a 100 percent make-to-order firm another. Volume produced could range from project manufacturing to continuous production. Diversity on those dimensions was desirable because both factors have implications for the design of discrete product planning and control systems, and we suspected that they could also be important for process industry firms. Because we limited the study to six firms owing to the amount of detailed data that was required, it was impossible to cover the extremes of both continua, but as much diversity as possible was the goal. We also expected that any influential factors identified in this study could have implications for the design of systems in discrete manufacturing firms. Third, a plant needed to have a well-defined, successful production planning and control system. The measurement of this criterion was based on information gathered from experts—consultants and academicians—who were familiar with a plant and its supporting information system. A previsit questionnaire provided a final filter to verify that a site was suitable for detailed study.

Participating firms were told of the purpose of the study and the time commitment required. We also assured them that they would have two opportunities to review the case description of their planning and control system and that nothing would be published without their final approval. They were promised the results of the study, including the six detailed case descriptions.

Data Collection

Descriptive data were collected in two phases: (1) a previsit questionnaire and (2) an on-site interview instrument. Members of the Process Industry Special Interest Group Executive Committee of APICS reviewed both instruments. The group consisted of academicians and consultants with expertise in process industry production planning and control.

The previsit questionnaire had three purposes. It provided information that was used to determine if a company was suitable for study. The questionnaire provided an indication of the success of a company's planning and control system and also aided in getting a diverse group of firms. Second, we obtained basic descriptive information, making on-site time more efficient for the interviewer and respondents. Third, some questions on the previsit questionnaire were duplicated on the on-site interview instrument to help identify inaccurate or conflicting information. The previsit questionnaire included questions related to the list of general characteristics exhibited by process manufacturers (Table 1) and questions related to the factors that affect production planning and control systems (Table 2). Additionally, several questions related to such company and plant characteristics as sales volume and investment per employee; direct labor ratio; inventory turns; accounting system; volume; strategy; competitive position; characteristics of the production process, such as its stages, the point where the product became discrete, and the percentage of discrete versus process manufacturing; and characteristics of the manufacturing information system, such as components of the production planning and control system and the degree of computerization. Information based on responses to selected questions appears in Tables 3 and 4 and in the descriptions of each firm.

The purpose of the on-site interview was to identify how the planning and control functions were accomplished and why they were accomplished that way. Questions fell into five categories corresponding to the five production planning and control functions identified by Vollmann, Berry, and Whybark (1984) and by Plossl and Wight (1971). The Appendix presents a condensed version of the on-site interview instrument. We interviewed three to six managers at each site, spending one to one and a half days at each. Each interview consisted of a series of open-ended questions, which allowed us to probe for additional detail. We took notes during the interviews and tape-recorded them.

Detailed case descriptions of 30 to 40 pages per case, based on the questionnaire and the interview, documented each company's production planning and control functions. We gave the respondents the descriptions so that they could check for accuracy and delete any sensitive information. We made suggested changes and returned the descriptions for final approval. Because some firms wanted to eliminate some detail if the company name was used, we chose to make all six cases anonymous.

Analyses

The factors that influenced each planning and control function were identified from each of the case descriptions in three steps. For each planning and control function and for each company, we identified the influential characteristics. Characteristics that were merely variations of a single element were combined into factors—for example, short and long manufacturing lead times were combined to create the factor length of manufacturing lead time. We considered factors that influenced the design of the planning and control system in three or more of the six cases important enough to be included in the descriptive model. Although this criterion may seem somewhat arbitrary, we felt that, given the diversity of the firms, three observations would indicate that an influence was likely to be common and would provide an excellent basis for follow-up research.

Once the factors were identified, we specified the relationships between the factors and the planning and control functions. Two continua were developed for each factor. For the first, each firm was placed according to its level for a factor. For example, the firms were placed on a continuum ranging from low to high demand stability. The second continuum was based on factors' effects on a selected parameter of a specific function within a planning and control system, as described by respondents. For example, respondents said that demand stability influenced the frequency of master production scheduling. We therefore placed the plants on a continuum according to how frequently they performed master production scheduling—daily, weekly, or monthly. We then compared the two continua for each factor to identify relationships between the measure of the factor and its influence on the planning and control function.

RESULTS

Descriptions of Firms

Table 3 provides a brief description of each of the six plants studied, including typical product routing patterns. The six process manufacturers were diverse on both criteria; they ranged from continuous manufacturing (company B, textiles) to total batch manufacturing (company A, pharmaceutical enclosures) and from employing 100 percent make-to-stock production (company C, foods) to 100 percent make-to-order (company B, textiles). Detailed descriptions of the six cases appear in Finch and Cox (1987).

Company A. Company A produced rubber pharmaceutical products like vial stoppers, syringe plungers, and enclosures for single-unit-of-dose containers. Compression molding was used to produce high volume, color-coded products. Several factors made the production process difficult. There are many different rubber formulas to ensure that enclosures will not react with the contents of a container. High quality standards were necessary. Pharmaceutical companies that use the company's products depend on a color-coding scheme to identify drugs before they are labeled, so contamination of a batch of enclosures by products of the wrong color could be catastrophic because it could lead to the mislabeling of a drug container. Although routings were fixed, scheduling products in the molding process was difficult because contrasting colors of enclosures had to be sequenced next to each other and because equipment and tooling constraints interacted. Molds for the products were extremely expensive ($120,000–$150,000). Orders competed not only for available machines but also for available molds. Moreover, other plants within the company used several products as raw materials.

Master production scheduling at company A was accomplished by accumulating order promises for the previous week and then, on Friday, scheduling the production for all plants at a central location. Managers performed

TABLE 3
Descriptive Information for Plants

Company A: Pharmaceutical Enclosures

Raw materials: rubber, fillers
Finished goods: Rubber stoppers
25% make-to-stock, 75% make-to-order
150 raw materials, 750 end-items
3 levels in typical bill of materials
1 day manufacturing lead time
Inventory: 36% raw materials
4% work-in-process
60% finished goods
Major work centers in routing:
Assemble ingredients, verification, rough mix, final mix, calendar, molding, trimming, dejunking, wash and dry, sample, quarantine while testing

Company B: Textiles

Raw materials: cotton
Finished goods: denim
100% make-to-order
165 raw materials, 20 end-items
3 levels in typical bill of material
5–6 week manufacturing lead time
Inventory: 14% raw material
43% work-in-process
43% finished goods
Major work centers in routing:
Opening, carding, drawing, spinning, warping, dyeing, beaming, weaving, finishing, mapping, cutting

Company C: Foods

Raw materials: grapes & other fruit
100% make-to-stock
10 raw materials, 100 end-times
1 level in typical bill of material
1–2 week manufacturing lead time
Inventory: 80% raw materials
20% finished goods
Major work centers in routing:
Inspection, grading, stemming, heating, dejuicing, pressing, filtering, pasteurizing, concentrating, cooling, pasteurizing filling, sealing, packing

Company X: Carpet

Raw materials: yarn, backing
Finished goods: Carpet
20% make-to-stock, 80% make-to-stock–assemble-to-order
500 raw materials, 5,000 end-items
4 levels in typical bill of materials
2 week manufacturing lead time
Inventory: 31% raw materials
32% work-in-process
37% finished goods
Major work centers in routing:
Air entangle yarn, warping, tufting, dyeing, shearing, coating

Company Y: Molding

Raw materials: rubber, fillers
Finished goods: car mats
20% make-to-stock, 80% make-to-order
90 raw materials, 350 end-items
5 levels in typical bill of material
1–2 week manufacturing lead time
Inventory: 30% raw material
10% work-in-process
60% finished goods
Major work centers in routing:
compounding, extruding, molding in-process storage, packing

Company Z: Magnetic Tape

Raw materials: film, oxides
80% make-to-stock, 20% make-to-order
1,200 raw materials, 650 end-items
7 levels in typical bill of material
1 week manufacturing lead time
Inventory: 26% raw materials
12% work-in-process
62% finished goods
Major work centers in routing:
Mixing, coating, slitting, burnishing, testing, loading, packing

internal priority planning manually, even though a computerized MRP package was used in the plant for creating raw-material purchase orders. The basis for capacity planning was a one-year forecast to examine capacity feasibility for the upcoming year. On-site schedulers identified potential short-term capacity problems and accomplished priority control tasks manually. Capacity control was accomplished continuously by analysis of the output of molding machines.

Company B. Company B produced indigo, black, and grey denim for apparel manufacturers. The firm contracted quarterly orders, resulting in a very stable demand and load on equipment. Customers' capacity contraints also contributed to demand stability. Routings were fixed, except for occasional differences in finishing requirements. The loom operation was the critical capacity constraint, and all other schedules were built to maximize use of the looms. High changeover costs resulted in long production runs.

Company B's master production schedule was based on the loom schedule and developed by marketing. Priority planning for dependent demand items was accomplished by backward scheduling all operations that precede weaving and forward scheduling all operations that take place after weaving. The company accomplished capacity planning manually by performing a "mill mix" analysis, which was a detailed capacity check of all work centers based on a change in product mix of the loom schedule. Priority control received little emphasis because of the stability of schedules. When needed, it was accomplished manually. Capacity control was of concern for the looms only. The company accomplished continuous monitoring and output analysis of all equipment with a sophisticated computerized process.

Company C. Company C produced fruit juices, jams, and jellies, mostly from grapes. As a make-to-stock firm owned by the fruit growers who supplied it, the company was obligated to purchase the entire harvest every year. Company C had a centralized marketing function that scheduled promotions but did not sell the products. Instead, independent brokers hired by the company made all sales. Routings were fixed for all products. The company pressed all grapes in the fall, because all harvesting took place in the fall.

The marketing department at company C established a yearly promotion plan and quarterly promotion schedules for production. Marketing also provided a forecast for each end-item. Production adjusted the forecast in light of historical events and used it to establish desired reorder points for warehouse inventories. The company accomplished internal priority planning manually and external priority planning for raw materials such as packaging items with an MRP program developed in-house. Capacity planning was accomplished by a Lotus 1-2-3 simulation of the master production schedule for all three plants. The Lotus spreadsheet model allowed a great deal of what-if analysis to be done to check the effects of various schedules on capacity. The company accomplished long-term capacity planning through a system designated the feasibility system and examined long-term capacity needs whenever an additional product line was considered. Priority control was minimal, however, and when sudden demand shifts occurred, stockouts were possible.[2] To prevent this, the company monitored sales daily and adjusted production schedules manually as needed. Capacity control was informal, and production was constant, making comparison of planned to actual output a simple procedure.

Company X. Company X produced institutional carpets. Most of its products were made-to-order, and most deliveries promised in two weeks, so demand fluctuated rapidly. The need for short lead times resulted in a make-to-stock, assemble-to-order operation. Because tufting and finishing requirements differed, routings varied.

Company X had developed a production plan for machine groups for long-range planning and scheduled end-item production for one or one-half days into the future. This is similar to the final assembly schedule used by many fabricating and assembly firms. Actual customer orders drove the priority planning function. The company accomplished priority planning by using a regenerative MRP technique, which was run daily, and it was developing a master production schedule to provide input to the MRP system for items with a lead time of more than two weeks. Priority control was rarely needed at this company. When priorities of end-items changed, expediting components was accomplished easily because of the short lead times. Capacity control was also simple. Orders were not released to the shop early, so queues were very short. Output was checked against plans and daily adjustments were made.

Company Y. Company Y produced car mats for use by automobile manufacturers and for sale by large retail chains. The company's production was approximately 20 percent make-to-stock and 80 percent make-to-order. Other plants used several of the products as raw materials. The plant had few work centers and had fixed routings.

Master production scheduling was a centralized process for several regional plants. A central headquarters received all orders for make-to-order items. Headquarters used a forecast to set minimum and maximum inventory levels for make-to-stock items and provided daily updates on inventory levels and actual orders for each plant. The master production schedule was developed from inventory data that was on hand and current orders. The company accomplished priority planning with the use of a manual MRP technique that exploded end-items into components and backward-scheduled to determine production start dates. Capacity planning was performed after schedules were developed by applying performance standards for molding equipment. A three-week planning horizon identified potential capacity problems. Priority control received little emphasis. Priorities for dependent demand items were updated manually when necessary. Outputs of all work centers were analyzed in a daily capacity control procedure.

Company Z. Company Z produced audio, video, and instrumentation tape for the United States government, the recording industry, and consumer markets. A variety of loading configurations resulted in variable routings. Yield variability was a major problem. Schedules for specific end-items had to take into account the length of a reel of tape and its quality level. The company produced pancakes of tape 10,000 feet long and cut desired lengths from the pancake. Test results frequently showed signal loss on portions of the 10,000-foot pancake. Because audio tape cannot be spliced, resulting lengths often did not meet specifications. Therefore, the end-item produced was frequently not the end-item scheduled.

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[2] A stockout occurs when demand cannot be satisfied from inventory.

The company's marketing department initiated master production scheduling with a production plan, a quarterly demand forecast for product families. This plan was disaggregated into a master production schedule by catalog item and updated monthly. The master schedule determined weekly production, or final assembly, schedules within the constraints of the production plan and incoming orders. The company used a weekly MRP regeneration, MASH-H, developed by the Martin-Marietta Corporation, to create purchase orders for all raw materials and production orders for metal and plastic components. Requirements for coated rolls of polyester film were created from the production plan because product families were based on coating and roll requirements. The company performed capacity planning manually for critical work centers as the production plan was developed. It did not use the capacity planning modules of the MASH-H system. A capacity requirements plan was developed for each work center in a manual process whenever a new production plan was implemented. Priority control procedures were manual and frequent. The company used daily dispatch lists to keep dependent priorities current. Capacity control at various work centers was a manual process. Cumulative progress toward order completion was monitored and compared to schedules.

Table 4 shows the factors identified, the five planning and control functions influenced, and the companies in which the influences were identified. A total of 19 factors were influential in at least two of the six plants, and 11 of the 19 factors influenced decisions concerning the design of the planning and control system in at least three of the six plants. Since several factors influenced more than one function, we identified 18 relationships between factors and functions. Relationships were shown by using absolute measures when possible and subjectively determined positions on continua when measures were not quantifiable.

Master Production Scheduling

Several characteristics that influenced the master production scheduling function were related to plants' material inputs; lead time and interplant transfer are examples of such characteristics. Other characteristics, such as the information source for demand, were related to information inputs. Characteristics of demand were also important, such as the number of customers and the predictability and stability of product demand and mix. Figure 1 presents factors that influenced the master production scheduling function in at least three firms and relationships to design decisions for the

TABLE 4
Factors That Influenced Planning and Control Functions

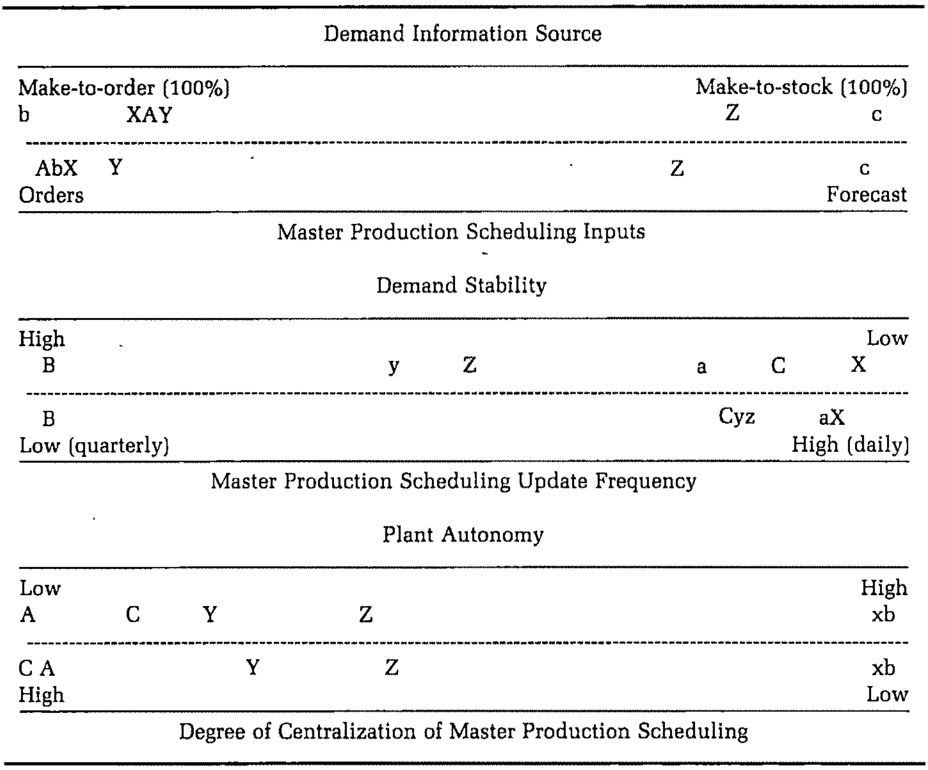
	Planning and Control Functions[a]				
Influential Factors	Master Production Scheduling	Priority Planning	Capacity Planning	Priority Control	Capacity Control
Lead time for raw materials	A, Z				
Demand information source	A, X, Y, Z	A, C			
Demand stability	B, C, X, Z		B, C, X, Z	C, X, Z	
Number of end-items	B, C				
Plant autonomy	A, C, Y, Z				
Depth of bill of material		A, B, C, X, Y, Z		A, B, C, Y, Z	
Amount of work-in-process inventory		A, B, C, Y, Z		A, B, C, Y, Z	
Manufacturing lead time		A, B, C, Y, Z		A, B, C, Y, Z	
Component commonality		A, C, Z			
Product volume		B, X	B, C	B, C	B, C
Staged work-in-process inventory	X, Z				
Lead time to increase capacity			A, X		
Machine and tooling constraints			A, Y		
Number of work centers			A, C, X, Y		A, C, Y, Z
Yield variability			B, Y, Z	A, B, Y, Z	A, B, Y, Z
Capacity flexibility			A, C, X, Z		
Sequencing requirements				A, Y	
Fixed versus variable routings		A, B, C, Y, Z		A, B, C, Y, Z	A, B, C, Y, Z
High quality requirements				A, Z	

[a] A, B, C, X, Y, and Z represent the companies described in Table 3.

master production scheduling function. The companies are placed according to their relative positions on the continua.

Three factors were identified as having important effects on the master production scheduling function. The first was the demand information source, which influenced the master production scheduling function in four of the six firms. Although most plants combined make-to-stock and make-to-order production, there was one company at each extreme. The more the actual customers initiated a company's demand, the more closely production scheduling was tied to the order-entry system. Companies whose demand was determined primarily by meeting reorder points in a distribution warehouse had scheduling functions more closely tied to their warehouse inventory control systems and forecasts. Companies with a combination of make-to-order and make-to-stock used a combination of scheduling techniques. Company C's production was 100 percent make-to-stock, with a master production scheduling function driven by a forecast from marketing. Company B's production on the other hand, was 100 percent make-to-order, and

FIGURE 1
Relationships Between Master Production Scheduling and Influential Factors[a]


Demand Information Source
Make-to-order (100%)
b XAY
Make-to-stock (100%)
Z c
AbX Y
Z c
Orders
Forecast
Master Production Scheduling Inputs
Demand Stability
High
B
y Z
a C X
Low
B
Cyz aX
Low (quarterly)
High (daily)
Master Production Scheduling Update Frequency
Plant Autonomy
Low
A C Y Z
High
xb
C A Y Z
xb
High
Low
Degree of Centralization of Master Production Scheduling

[a] A capital letter for a plant code indicates the factor was reported as influential; a lower case letter indicates the factor was not reported as influential.

its scheduling function was constructed from the quarterly orders received from customers. The characteristics of the companies that had a combination of make-to-stock and make-to-order production influenced the master production scheduling function also. Company X, for example, was 20 percent make-to-stock and 80 percent make-to-order. To shorten the manufacturing lead time for orders, the company made backings and commonly needed unbacked and undyed carpets to stock and then dyed and assembled (backed) them to order. Most of the 80 percent of production that was make-to-order was actually make-to-stock and assemble-to-order.

The second factor that influenced the master production scheduling function was demand stability, which influenced how frequently a master production schedule was updated. Companies with a very unstable demand needed to update their schedules frequently, and companies with a very stable demand did not need to update as often because the priorities of independent demand items were not changing. Company X, for example, experienced daily fluctuation in demand and reacted by replanning daily. In contrast, company B contracted quarterly orders and did not need to replan until it received new orders.

The third factor, called plant autonomy for the purposes of this study, was related to a plant's relationship with its corporation's headquarters and other plants. Plants that are not autonomous depend on a central order-entry system or on central promotion schedules for information on demand. Company C was a prime example of such a situation. Marketing, which drove the promotion schedule, was centralized. The master production schedule for the firm's three plants, in New York, Michigan, and Washington, was centralized. Plants may also depend on other plants as feeders or may feed other plants with raw materials. Company Y, for example, produced rubber sheets that another plant used as a raw material for carpeted mats. Company Y developed the schedule for the other plant on the basis of its own production schedule. A similar situation existed at company A, which produced rubber components used by another plant as a raw material. The firm made enough interplant material transfers to make a centralized master production schedule desirable.

Priority Planning

Characteristics that influenced the priority planning functions of the six cases were related to the production process and the product structure. The number of levels of the parts list that defined the product frequently had an influence. Such a parts list is known as a bill of material, and its number of levels is called its depth. A bill of material's structure depends on the production process, the number of work-in-process stages,[3] and the type of transformation process used. Figure 2 presents the factors that influenced design

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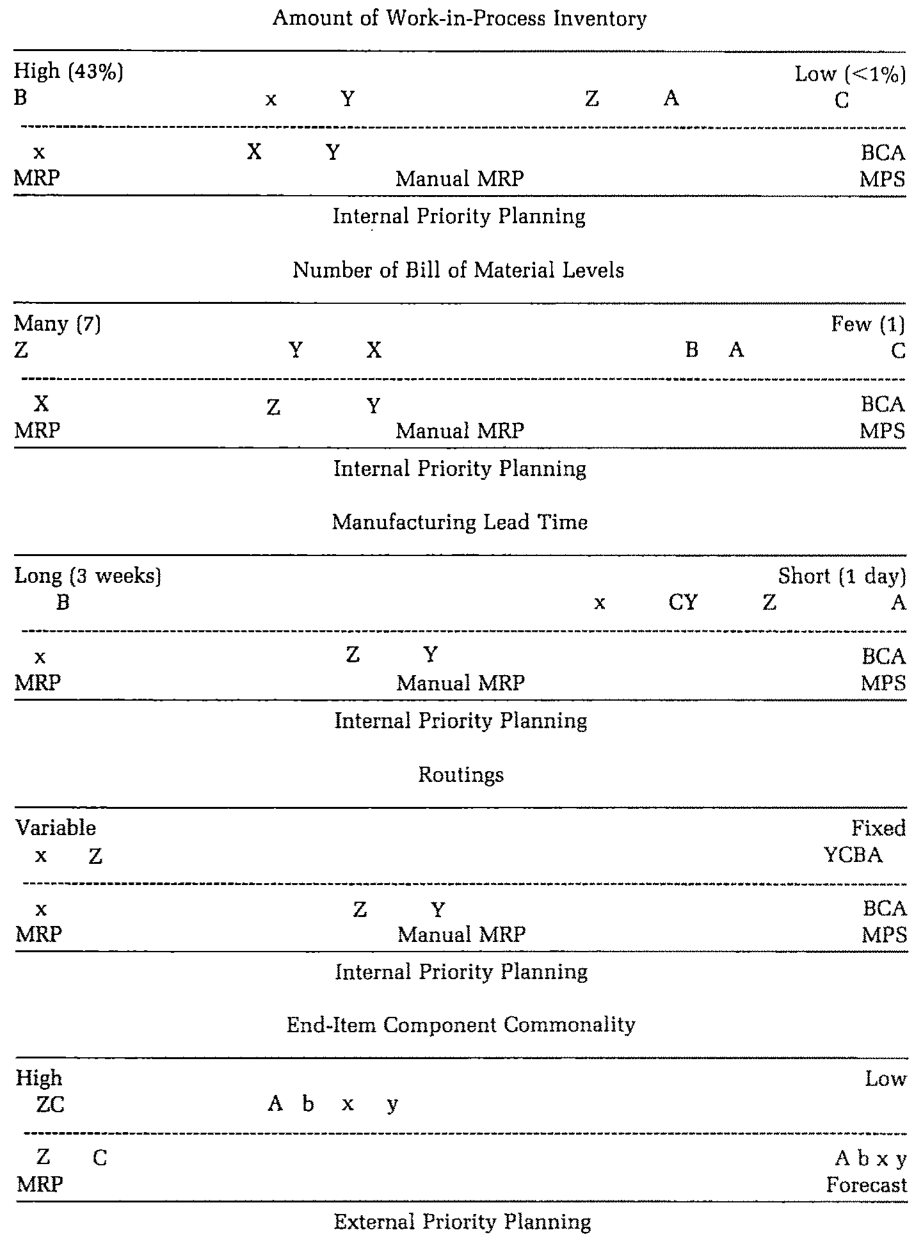
[3] Work-in-process inventory can be either of two types. Stages of production are often stored to reduce lead time. These are typically assemblies or subassemblies in discrete product manufacturing. Work-in-process inventory may also take the form of jobs waiting to be processed.

FIGURE 2

Relationships Between Priority Planning and Influential Factors[a]


Amount of Work-in-Process Inventory
High (43%)
Low (<1%)
B x Y Z A C
x X Y BCA
MRP
Manual MRP
MPS
Internal Priority Planning
Number of Bill of Material Levels
Many (7)
Few (1)
Z Y X B A C
X Z Y BCA
MRP
Manual MRP
MPS
Internal Priority Planning
Manufacturing Lead Time
Long (3 weeks)
Short (1 day)
B x CY Z A
x Z Y BCA
MRP
Manual MRP
MPS
Internal Priority Planning
Routings
Variable
Fixed
x Z YCBA
x Z Y BCA
MRP
Manual MRP
MPS
Internal Priority Planning
End-Item Component Commonality
High
Low
ZC A b x y
Z C A b x y
MRP
Forecast
External Priority Planning

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[a] A capital letter for a plant code indicates the factor was reported as influential; a lower case letter indicates the factor was not reported as influential. MRP = material requirements planning, MPS = master production scheduling.

decisions in the priority planning function and the relationships of the functions.

Five interrelated factors influenced the priority planning function: the amount of work-in-process inventory, the depth of the bill of material, the length of manufacturing lead time, the presence of fixed routings, and the commonality of components. Those factors affected two priority planning design decisions. The first was whether or not to use the MRP technique for creating production orders for dependent items (internal priority planning). The second was whether or not to use the MRP technique to create raw material purchase orders (external priority planning).

The amount of work-in-process inventory, depth of the bill of material, length of manufacturing lead time, and presence of fixed routings are closely related issues, and all played a part in determining the type of internal priority planning system needed by a company. The primary function of MRP is to plan work-order priorities by developing net requirements, or total requirements minus on-hand inventory, and then time-phasing—backward-scheduling to adjust for lead time—from the finished product's due date to plan a production order release. One reason for keeping work-in-process inventory is to reduce manufacturing lead times. That reduction can be accomplished by strategically placing inventory before diverging points in the production process. Doing so preserves flexibility for as long as possible but also allows for preceding steps to be completed, thus reducing lead time for customers. If a bill of material has few levels, the number of different parts that can be stored in inventory is reduced. If no on-hand inventory exists, net requirements will equal gross requirements. Net requirement calculations are therefore minimized and MRP is not necessary. The depth of the bill of material influenced the priority planning function in all six plants. Company C provided an excellent example of a very shallow bill of material (two levels). Very little work-in-process inventory existed, and the company did not use MRP for internal priority planning. Other firms with shallow bills of material were company A and company B, both of which had bills with three levels. Neither firm used MRP as an internal priority planning technique. Company Y had five levels in its typical bill of material and used a manual MRP technique for internal priority planning. Company X and company Z, with five and seven levels in their bills of material, both used MRP for internal priority planning.

If routings are fixed, the priorities set for an end-item are generally carried through to all dependent demand items. No changes in priorities occur because the flow through the production process is steady. Fixed or variable routings influenced the priority planning function in five of the six plants. MRP does an excellent job of keeping priorities current when routings are variable. When dependent demand items compete for the same equipment, dependent priorities are constantly being adjusted. When routings are fixed, priorities are constant, and MRP's ability to adjust them is not required.

Company A, company B, company C, and company Y all had fixed routings. None of the four firms used MRP for internal priority planning. Because tufting and finishing requirements varied, company X had variable routings, as did company Z, which had different loading configurations in one area of the plant. Both firms used MRP for internal priority planning, company Z in that one area of the plant only. Fixed routings are analogous to a pipeline system in which the pipes maintain the sequence of jobs entered into the system. If routings are fixed, the physical production system prevents dependent demand priorities from being interrupted.

The lack of work-in-process inventory in queues can contribute to a short manufacturing lead time. Large amounts of such inventory in queue in front of processes results in longer queue times and therefore longer manufacturing lead times. Less work-in-process is frequently the result of shorter queues. Since most lead time is spent in queue, the shorter the queue, the shorter the lead time. Although a crude measure, the amount of work-in-process inventory influenced the priority planning function in five of the six plants. Work-in-process inventory as a percentage of total inventory ranged from a low of 1 percent at company C to a high of 43 percent at company Y. Company X, which determined all dependent demand priorities with MRP, had a work-in-process inventory of 32 percent. Company Z, which used MRP to determine dependent demand priorities in one part of its operation, had 12 percent, a somewhat misleading figure because the amount of work-in-process in the areas of the plant using MRP appeared to be much higher than the overall figure. A breakdown of the work-in-process percentage by plant areas was not available, however. Caution should be taken in using percentage of work-in-process inventory as a measure. Make-to-stock companies have traditionally had a high percentage of finished goods, whereas some make-to-order producers have had high percentages of raw materials, such as agricultural commodities. These conditions can distort percentage relationships. Dollar days (Sorrell & Srikanth, 1985) might be a more appropriate measure of work-in-process activity.[4]

The length of manufacturing lead time also influenced the priority planning function in five of the six plants. Lead time ranged from one day (company A) to three weeks (company B). If the lead time is extremely short—less than the size of the time bucket—the product is completed before an adjustment to dependent demand priorities could be made. Adjusting the priorities, if it is possible, would not have a significant effect on completing an order. Any needed priority changes are performed at the independent demand level, reducing the need to adjust dependent demand priorities and reducing the need for MRP.

The four factors—depth of the bill of material, lack of work-in-process inventory, length of manufacturing lead time, and presence of fixed routings—influenced the priority planning function and determined the need for MRP to release production orders. Examination of Figure 2 reveals some inconsistencies, however, in our generalizations about relationships between factors and functions. Company B, for example, had a relatively long manufacturing lead time (three weeks) compared to the other firms (one to ten days), but it did not use MRP. Many discrete product MRP users have lead times of over a year, however. If the use of MRP is associated with product lead time, one would expect a very well-developed computerized system. It appears that factors interact to influence design decisions. Company B, for example, did have a relatively long lead time and large amounts of work-in-process inventory, which would favor using MRP, but it did not have deep bills of material, and it did have fixed routings, both of which reduce the need for MRP. When influential factors interact, some may outweigh others and dictate the requirements of a system.

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[4] Dollar days is a measure of the level of inventory in terms of its quantity and the length of time it will be in the plant. For all types of inventory, the measure is equal to the value of the inventory times the number of days before it can be sold.

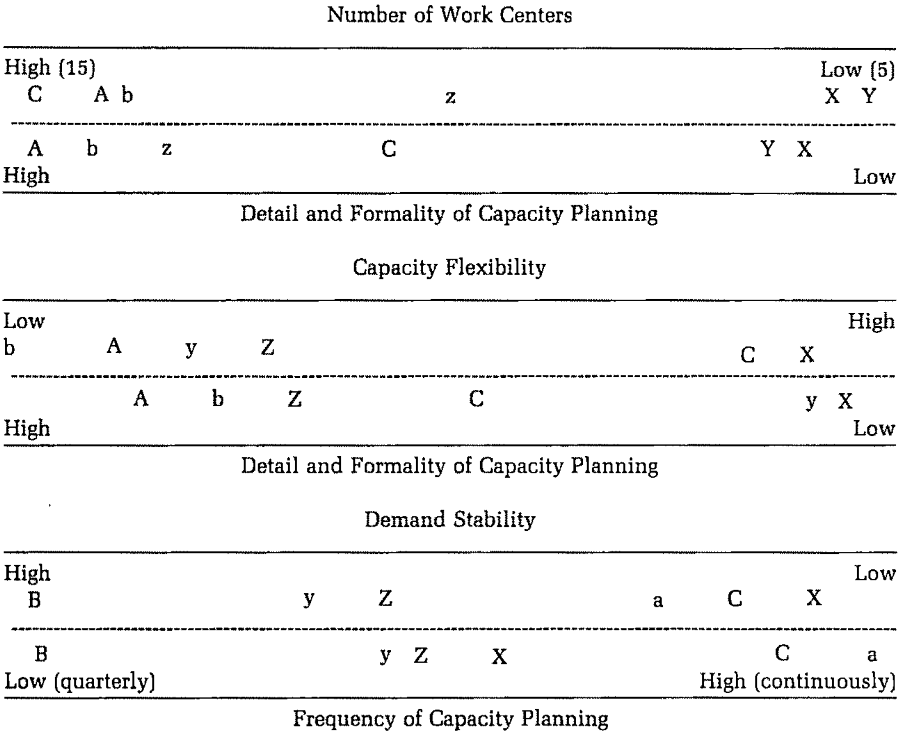
The fifth factor influencing priority planning contributed to the use of MRP also, but for creating raw material purchase orders rather than production orders. Companies that had a great degree of commonality of raw materials across end-items used MRP to create purchase orders. The degree of commonality of components influenced the priority planning function in three of the six plants. The ability of MRP to accumulate all requirements for a given raw material, across all bills of material, was beneficial in that environment. Two of the firms studied, company Z and company C, had high raw material commonality across end-items even though they had large numbers of different end-items. Both firms used MRP for creating raw-materials purchase orders but did not use MRP for production orders, although they had MRP in the plant.

Capacity Planning

The characteristics that influenced the capacity planning function tended to be related to the availability and flexibility of facilities and equipment. The flexibility of equipment, number of work centers, lead time in obtaining additional capacity, yield variability, and the existence of tooling constraints were characteristics that influenced the capacity planning function. Four factors influenced the capacity planning function in at least three plants. Figure 3 shows the relationships between design decisions about capacity planning and influential factors.

The first factor was capacity flexibility. The existence of excess capacity, or having more capacity available than what was required, resulted in capacity flexibility. If there is no excess capacity, a company must minimize changeovers to reduce the amount of equipment downtime. Excess capacity allows more frequent changeovers and thus increases the ability to run small lots and respond quickly to orders. In such a situation, capacity flexibility in the short term is increased. The primary impact of increased capacity flexibility was to reduce the amount and detail of capacity planning. If flexibility existed in the short term, short-term capacity planning was deemphasized because it was unnecessary. If capacity flexibility existed in the long term, in the form, for instance, of unused building space, long-term capacity plan-

FIGURE 3
Relationships Between Capacity Planning and Influential Factors[a]


Number of Work Centers
High (15)
Low (5)
C A b z X Y
A b z C Y X
High
Low
Detail and Formality of Capacity Planning
Capacity Flexibility
Low
High
b A y Z C X
A b Z C y X
High
Low
Detail and Formality of Capacity Planning
Demand Stability
High
Low
B y Z a C X
B y Z X C a
Low (quarterly)
High (continuously)
Frequency of Capacity Planning

[a] A capital letter for a plant code indicates the factor was reported as influential; a lower case letter indicates the factor was not reported as influential.

ning was less important. Capacity flexibility influenced the capacity planning function in four of the six plants. Company C had excess capacity in all production areas, which helped them respond quickly to orders. Because of the excess, very little capacity planning was done. Capacity planning consisted of informal manual checks. Company B, on the other hand, was very much constrained by the looms' capacity. Capacity utilization was critical in that area and thus was a very high priority. It was a formal procedure and fully computerized.

The second factor identified, the number of work centers in a facility, influenced capacity planning in four of the six firms. In general, the larger the number of work centers, the more difficult capacity planning becomes. Many work centers resulted in a highly formalized function, and few work centers, in less formal planning procedures. With few work centers, the procedures were more likely to be manual and moderately structured. Although not specifically identified as an influential characteristic, the number of work centers per routing appeared to have an effect similar to that of the total number of work centers in a plant. Company B and company Y provided two extreme examples. The large number of work centers at company B (see Table 5) made capacity planning more difficult than at company Y. Company B employed a computerized capacity planning technique for short-, medium-, and long-term capacity planning. Company Y had few work centers to plan for and thus was able to accomplish the necessary capacity planning tasks in an informal manual procedure.

Demand stability, which influenced the master production scheduling function, also influenced the capacity planning function. The less stable the demand, the more frequent was capacity planning. This factor influenced the capacity planning function in four of the six firms. Capacity planning at company B and company X illustrates this phenomenon. As stated earlier, the looms presented a critical capacity constraint at company B. Capacity planning at company B was performed whenever a change in product mix resulted in loom changes. As long as no change in loom configuration was needed, capacity requirements were stable and no planning was needed. Company X, because it promised short lead times to customers and had a make-to-order strategy and a very seasonal demand, had an unstable demand for the product and an unstable demand on resources. Capacity planning at company X was a formal, computerized, daily procedure.

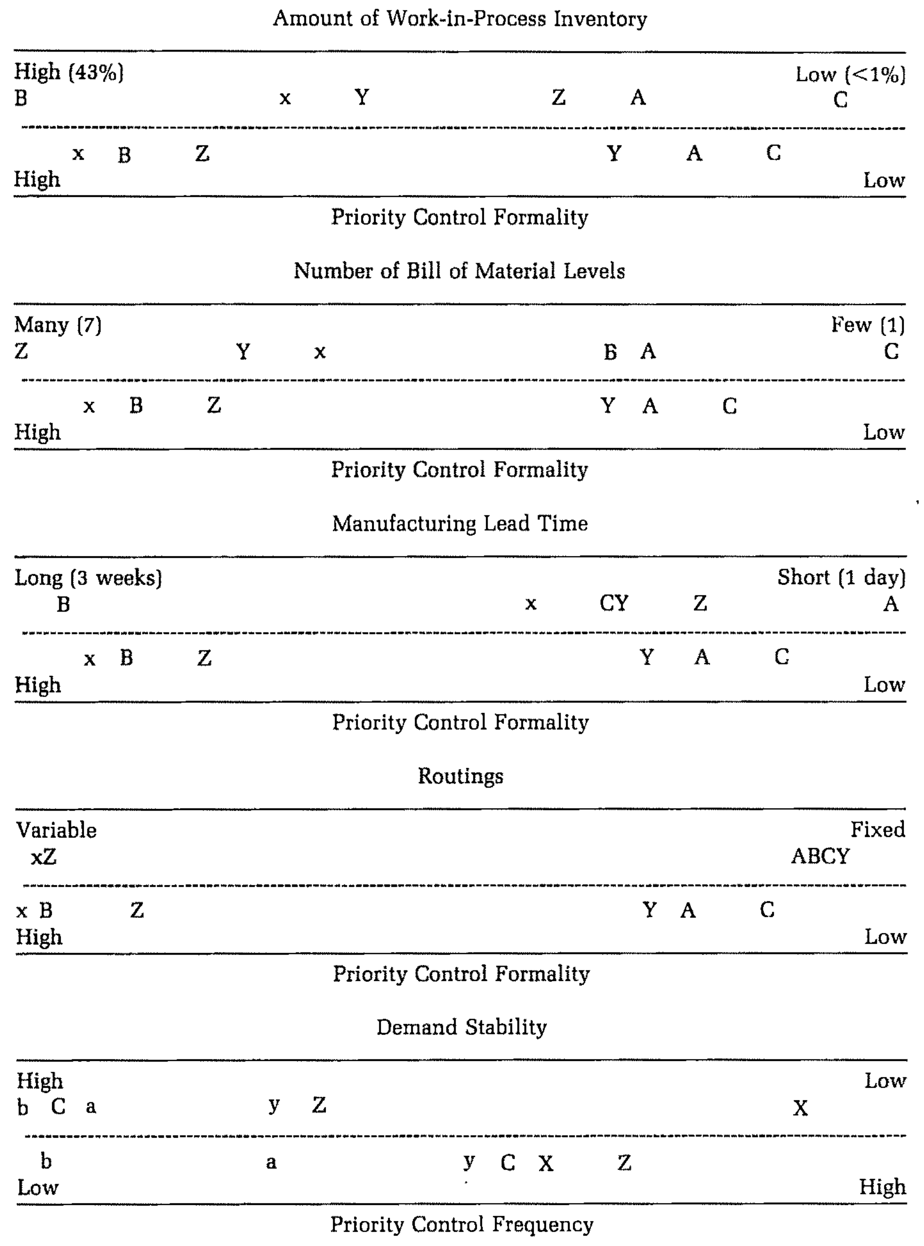
A fourth factor influencing the capacity planning function, yield variability, did not influence a particular design decision. The greater the yield variability, the more uncertain and unreliable the results of capacity planning. None of the firms had an adequate planning and control solution to the problem. However, some firms attacked the problem through statistical process control.

Priority Control

None of the six companies studied had highly sophisticated formal priority control functions. Like priority planning, the priority control function was influenced by characteristics related to bills of material, manufacturing lead times, and routings. Two companies with high quality requirements had sophisticated lot-tracing systems as a part of their priority control practices.

The need for formal priority control procedures depends on the use of a formal priority planning system. The firms who needed to set dependent demand priorities used MRP for internal priority planning. The four factors that influenced the internal priority planning function influenced the priority control function as well. Those four factors, the amount of work-in-process inventory, the number of levels in the bill of material, manufacturing lead time, and fixed routings, occurred in several cases. An additional factor, demand stability, which influenced master production scheduling, also influenced this function. The first four factors influenced the formality of the system. The fifth factor influenced the frequency of priority control action. The more frequently independent demand priorities change, the more frequently the priorities of dependent demand items would have to be updated. Figure 4 illustrates the influential factors and their relationship to priority

FIGURE 4
Relationships Between Priority Control and Influential Factors[a]



[a] A capital letter for a plant code indicates the factor was reported as influential; a lower case letter indicates the factor was not reported as influential.

control design decisions. Companies are placed in their appropriate positions on the continua.

The amount of work-in-process inventory influenced the priority control function in five of the six firms. A lack of such inventory means that few dependent demand items exist in the system. If there are few dependent demand priorities, a formal procedure is not necessary. As stated earlier, work-in-process inventory as a percentage of total inventory ranged from 1 percent at company C to 43 percent at company Y. Company X also had high levels of work-in-process inventory. Company Z, although it had low levels of work-in-process overall (12%), had higher levels in the area in which MRP was used.

The number of levels in the bill of material influenced this function in five of the six firms. The number of levels ranged from two to seven. The deeper the bill of material, the more work-in-process inventory and the greater the need to plan dependent demand priorities. Planning priorities resulted in a need to keep daily priorities current also.

The length of manufacturing lead time influenced the priority control function in five of the six companies. Manufacturing lead times ranged from one day to three weeks. Short lead times reduced the necessity of updating dependent priorities. If an entire production process was completed in a short time, changing due dates of components would not significantly change their completion dates. Therefore, little need would exist to monitor and control the dependent priorities day-to-day.

The presence of fixed routings influenced this function in five of the six firms. Fixed routings resulted in priorities that were established by the master production schedule, and the sequence was then controlled by the physical production system.

Formal priority control procedures usually involve the use of the daily dispatch list that assigns priorities to the jobs in queue at various work centers. Two firms, company C and company Z, required such action. They were also the only firms that used MRP for internal priority control action. Company C required priority control actions in the filling and packaging phase of production. The remaining firms used informal manual methods of maintaining dependent demand priorities when necessary.

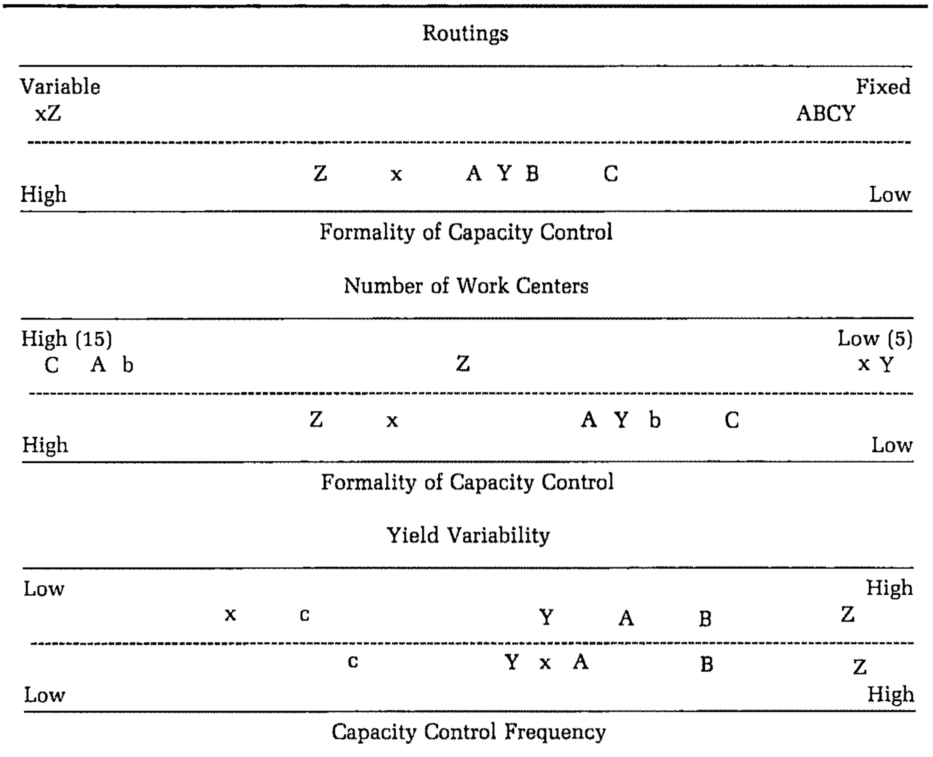
The fifth factor influencing priority control, demand stability, was important in three of the six companies. If independent demand was stable, a formal system for updating and monitoring dependent demand priorities was unnecessary. The more variable the demand, the more important it is to ensure that daily dependent demand priorities are consistent with end-item priorities. Because of the frequency of demand changes, priority control actions at company X were also very frequent, occurring throughout each day. Priority control actions at company Z were daily, however. Priority control actions at company B occurred only when product mix changes occurred.

Capacity Control

Three factors influenced the capacity control function. The characteristics that influenced this function, like those influencing capacity planning, related to the equipment and work centers. The factors that influenced the capacity control function were: the presence of fixed versus variable routings, the number of work centers, and yield variability. Figure 5 presents the influential factors and their relationships to the capacity control function.

A manufacturer's major capacity control task is to compare planned output to actual output and to adjust output when necessary. Input control is also important to control the length of queues and thus control lead time. The presence of fixed routings influenced this function in five of the six firms. The more fixed the routings, the simpler the capacity control function. Fixed routings resulted in a steady demand on equipment, reducing competition for machines, and making capacity requirements more predictable. Fixed routings also resulted in small queues and little need for input control. Company A, company B, company C, and company Y had fixed routings.

FIGURE 5
Relationships Between Capacity Control and Influential Factors[a]


Routings
Variable
xZ
Fixed
ABCY
Z x A Y B C
High
Low
Formality of Capacity Control
Number of Work Centers
High (15)
C A b
Z
Low (5)
x Y
Z x A Y b C
High
Low
Formality of Capacity Control
Yield Variability
Low
High
x c Y A B Z
c Y x A B Z
Low
High
Capacity Control Frequency

[a] A capital letter for a plant code indicates the factor was reported as influential; a lower case letter indicates the factor was not reported as influential.

The number of work centers influenced this function in four of the plants. A small number of work centers simplified the capacity control function. Companies with a large number of work centers were less likely to perform capacity control tasks manually or informally. Company B was an excellent example. Although routings were fixed there, the loom department consisted of 480 separate machines, each capable of many different configurations. The company used a computerized monitoring system to track output, downtime, and efficiency. Company C also monitored outputs from each work center by using process control equipment. Company Y, on the other hand, was able to manually accomplish capacity control tasks daily.

Yield variability influenced the capacity control function. If an additional run was required because of lower than expected yield, the schedule was adjusted. If a higher than expected yield was obtained, work-in-process inventory was created and the schedule adjusted. Variability increased the need for a formal priority control function. Yield variability resulted in a variable, unpredictable output. The more variable the demand, the more frequently capacity control action, even informal action, is required. The capacity control procedures of company A, with yield variability in the molding process, and company Z, with yield variability after testing, required both firms to constantly monitor outputs and adjust schedules to meet demand.

CONCLUSIONS AND DISCUSSION

Obviously, a data set of six firms prevents us from making broad generalizations about the results of this study. We cannot claim that the factors and relationships we examined are comprehensive or that they are generalizable to all process-oriented firms or to discrete product firms, but we can draw several conclusions. First, it appears that the concept of a generic process industry makes little sense. The diversity in the small group used in this study shows that, from the planning and control system standpoint, these firms cannot logically be lumped into one category that would require one standard planning and control system. Second, we expect many of the factors would also be influential in discrete product industries. The measure of each factor, however, would be likely to differ for discrete manufacturers. For example, manufacturing lead time would likely be an influential factor to consider for the design of a planning and control system in any plant. A six-week lead time was considered long for a process manufacturer in this study but would be a very short lead time for a typical discrete product manufacturer. The measure of each factor depends on individual plant characteristics, as comparing the 11 factors to the process industry characteristics presented in Table 1 demonstrates. Many of the characteristics identified in this table result in each company's position on the dimension of each factor. Third, the results of this study do not support generalizations like "Process industries can't use MRP," or "Process industries have different planning and control requirements than discrete product industries." The process orientation of the firms studied results in certain characteristics being present frequently. Those characteristics often differentiate process manufacturers from discrete product manufacturers and result in different planning and control system requirements. However, within the process industry classification, other differences exist. Although the six firms we studied shared some similarities, they also had differences that resulted in different planning and control system requirements. Fourth, contrary to popular belief, not all firms need the traditional closed-loop MRP framework. Some function quite well without it, and others function well with only the MRP technique logic. To evaluate the success of a system by its inclusion of a given number of modules or techniques ignores the fact that different plants have different needs. To include unnecessary elements in a planning and control system makes the system more complex than necessary and may contribute to a loss of system integrity.

The results reported here have implications concerning the 11 factors and the design and operation of production planning and control systems. The following observations are grouped according to the five planning and control functions.

Master Production Scheduling

The less the demand stability, the more frequently the required updating of the master production schedule.

The higher the percentage of the make-to-order portion of total production, the more closely the master schedule should be tied to the customer-order entry system.

The more autonomous the plant, the less the need for a centralized scheduling function.

Priority Planning

The larger the amounts of work-in-process inventory, the greater the need for the MRP technique to plan dependent demand priorities within the plant.

The larger the number of levels in the bill of material, the greater the need for MRP.

The longer the manufacturing lead time, the greater the need for MRP to plan dependent demand priorities within the plant.

The more variable the routings, the greater the need for MRP to plan dependent demand priorities within the plant.

The higher the degree of commonality of parts across end-items, the greater the need for MRP to plan dependent demand priorities for purchased parts.

Capacity Planning

The larger the number of work centers, the more detailed and formal the capacity planning function.

The lower the capacity flexibility, the more detailed and formal the capacity planning function.

The less the demand stability, the more detailed and formal the capacity planning function.

Priority Control

The higher the amount of work-in-process inventory, the more formal the priority control function.

The more levels in the bill of material, the more formal the priority control function required.

The longer the manufacturing lead time, the more formal the priority control function.

The less the variability of routings, the more formal the priority control system.

The less the demand stability, the more frequent the priority control regeneration required.

Capacity Control

The greater the variability of routings, the more formal the capacity control system.

The larger the number of work centers, the more formal the capacity control system.

The higher the yield variability, the more frequent the capacity control function is required.

These 19 implications require further validation before they can be accepted as principles governing the design and operation of planning and control systems. A larger number of firms should be examined where volume of product is used as a selection criteria and the firms are more representative of the entire continuum. The characteristics and factors that appear in Tables 1 and 2 that were not found to influence any of the firms studied here also warrant further detailed investigation. Once a comprehensive list of influential factors has been identified and their relationships to the functional areas hypothesized and proven, their interrelationships must be addressed.

As was discussed, this study was the first step toward building a prescriptive model that could prescribe a specific design decision on the basis of certain influential factors. Development of performance measures for each planning and control function is a prerequisite to this step.

The detailed examination of the planning and control systems of these six firms helped to identify several other research issues. First, this research needs to be duplicated for discrete product manufacturers to identify influential factors and relationships to planning and control system design. Second, we observed an interesting phenomenon relating specifically to how priority planning functions were accomplished that may involve other functions as well. We observed that influential characteristics may vary in different areas of a plant and at different phases in its production process. Company Z, which used MRP in one part of its plant but not in others, was an example. If specific characteristics result in certain design decisions being more appropriate than others, then it seems that planning and control system requirements may vary within a plant. The identification of this phenomenon and its causes in other plants is an important direction for future research. Third, absolute measures, rather than just relative measures, for the characteristics that influence various design decisions should be investigated for process and discrete manufacturing.

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APPENDIX

On-Site Interview Questions

On-site interviews were conducted at each site. The questions were open-ended to elicit as much detail as possible and allow for additional probing by the interviewer if necessary. The questions were grouped into five areas corresponding to the five planning and control functions addressed in this study. We asked four general questions for each function and a number of specific questions.

General Questions

1. What product characteristics are most important in determining the procedures used for this function? What impact have these characteristics had on the current procedures?
2. What plant characteristics are most important in determining the procedures used for this function? What impact have these characteristics had on the current procedures?
3. What environmental characteristics are most important in determining the procedures used for this function? What impact have these characteristics had on the current procedures?
4. What are common problems associated with this function? How are they dealt with?

Specific Questions

Master Production Scheduling

1. Describe the master production scheduling system used.
2. Which items are included in the MPS?[a] Which are not?
3. What time horizon does the MPS cover?
4. What is the size of the time bucket used in the MPS?
5. How frequently is the master schedule updated?
6. How is the master schedule linked to the production plan?
7. What units are specified in the production plan?
8. Is the master schedule disaggregated further before its execution?

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[a] MPS = master production scheduling.

9. Are mathematical modeling techniques, such as linear programming, used to help develop the schedule? If so, how are they used?
10. Which components of master scheduling are done manually? Which are done by computer?
11. What types of software packages are used?
12. How is forecast information used in the MPS?
13. How is customer order information used in the MPS?
14. How is backlog information used in the MPS?
15. What percent of the master schedule is composed of past due orders?
16. How are production run lengths determined?
17. Are simulations run to answer "what-if" questions concerning the MPS?
18. What types of direction does the MPS get from top management?
19. Describe the entire MPS process, from beginning to end.
20. How is the performance of the MPS measured?

Priority Planning

1. Is material requirements planning (MRP) used to determine vendor and shop order release dates for component items?
2. If MRP is used, describe the system.
3. If MRP is not used, how are material requirements determined for component item?
4. What parts of this process are done by computer? What parts are done manually?
5. What information is required to determine these requirements?
6. How frequently does this take place?

Capacity Planning

1. How is capacity defined and measured?
2. What type of long-term capacity planning procedure is used?
3. Are capacity bills or resource bills used?
4. What level of aggregation is used in long-term capacity planning?
5. Which facilities are included in your long-range capacity plan?
6. What time horizon is used in long range capacity planning?
7. How frequently is long-range capacity planning done?
8. What types of decisions are made from the long-range capacity plan?
9. When annual requirements are expected to be less than capacity, what adjustments are made to increase output?
10. When annual requirements are expected to exceed capacity, what adjustments are made to reduce output?
11. In the medium and short term, how is the master production schedule checked for feasibility?
12. How frequently is this done?
13. What is this information used for?
14. Which work centers are checked?
15. What are the information inputs to this process?
16. When short term requirements are seen to exceed capacity, what options exist for increasing output?
17. When short term requirements are seen to be less than capacity, how is output reduced?

Priority Control

1. Once an order is released to the shop floor, is the order priority adjusted to keep up with MPS changes?
2. How is this adjustment made?
3. How does the final assembly or final blending schedule relate to the MPS?
4. Is lot traceability a part of your planning and control system? How is this accomplished?
5. When several orders are open, how are relative priorities determined?
6. How is production and consumption of materials measured and reported?
7. How is yield, scrap, and quality controlled?

Capacity Control

1. In which work centers is capacity monitored?
2. How is equipment utilization monitored and measured?
3. How frequently are these measurements made?
4. How is manpower utilization monitored and measured?
5. How frequently are these measurements made?
6. How frequently are they reported?

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RESEARCH NOTES

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DIVERSIFICATION AND THE RISK-RETURN TRADE-OFF

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Early studies of diversified firms compared their profitability to that of undiversified firms (Gort, 1962; Markham, 1973). More recent studies have classified firms according to their specific diversification strategies and compared the profitability of firms in the various diversification categories. For example, Rumelt (1974, 1982), Christensen and Montgomery (1981), and Palepu (1985) showed that firms diversified into related businesses were more profitable than other diversified firms. Other investigators (Bettis, 1981; Bettis & Hall, 1982; Bettis & Mahajan, 1985) have emphasized the importance of considering the trade-off between risk and return in assessing the effects of diversification. Such a trade-off occurs when firms deliberately choose to diversify into unrelated businesses with lower profitability if their risk is thereby reduced.

Empirical results about the risk-return trade-off are currently inconclusive, with some studies reporting that such a trade-off exists and others that firms can simultaneously increase profitability and reduce risk. Three studies (E. H. Bowman, 1980, 1982; Fiegenbaum & Thomas, 1986) have shown that in many industries a negative correlation exists between profitability and risk, although the third study showed that the correlation is unstable over time and hardly exists when market-based measures of risk are employed. Bettis and Mahajan (1985) focused on individual firms and showed that some firms were able to increase profits and reduce risk simultaneously, but they suspected that their results were due to the concentration of their sample firms in certain industries. More recently, Aaker and Jacobson (1987) empirically examined the role of both systematic, or relative, and unsystematic, or firm specific, market risk in explaining differences in firms' profitability. They pointed out the inconsistent conclusions of the few studies on

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the association between accounting-based measures of return and risk and the need to distinguish between the two components of market risk. Their findings showed that both components of risk have substantial, significant, and different effects on the profitability of firms.

The purpose of this research was to investigate the risk-return trade-off at the level of individual firms with both accounting- and market-based measures of risk. Following the approach of Bettis and Mahajan (1985), we first classified firms into clusters according to their risk-return characteristics and then compared diversification strategies, capital market measures of risk and return, and some operating characteristics of the firms across the clusters. The current study extended prior research efforts along the following dimensions. (1) We used a cash-flow surrogate rather than accounting profits to classify firms into clusters. (2) We examined market measures of risk and return in the various clusters. (3) We measured the profitability and risk of firms in the various clusters seven years after the initial classification into clusters. (4) We used a large group of firms and continuous measures of diversification.

METHODS

Data and Firms

The data were obtained from the COMPUSTAT business segment tape, which contains data on business segments reported by publicly traded firms in their 10-K or annual reports. According to a publication of the Financial Accounting Standards Board (1976), firms must provide supplementary information about their business segments. A segment is any group of related businesses that accounts for at least 10 percent of the consolidated revenues, consolidated profits, or consolidated assets. For each segment, firms disclose the sales during the year, the operating income before allocation of corporate expenses, and the assets that can be identified with the segment. The COMPUSTAT data include all three items for each segment, along with the one or two Standard Industrial Classification (SIC) codes and the segment's name. In addition, we extracted detailed financial data from the COMPUSTAT annual industrial file and the Center for Research in Security Prices daily returns file.

All firms represented on the COMPUSTAT tapes were first ranked in descending order of sales in 1984. We then eliminated financial service firms and regulated utilities and firms that did not have at least six years of segment data for the period 1977–84. The first 400 firms that remained on the list provided data for the study. The data set consisted, therefore, of large corporations, with sales ranging from $90.8 billion to $855 million, with a mean of $4.925 billion. We excluded the financial and utility industries because they usually follow different operating strategies and are subject to different accounting regulations. Additional firms were deleted for certain analyses when data were missing. We performed all analyses using at least 269 firms. Tables 1 and 2 provide summary statistics concerning the firms for the years 1977 and 1982.

TABLE 1
Descriptive Statistics for 1977 and 1982

Variables[a]	Number of Firms	1977 Means	1977 Standard Deviations	1982 Means	1982 Standard Deviations
Profits	365	0.13	.05	0.11	.07
Profit variability	372	0.03	.02	0.03	.02
Total diversification 1	368	0.50	.23	0.53	.21
Total diversification 2	368	0.92	.48	0.98	.43
Related diversification	368	0.26	.34	0.27	.33
Unrelated diversification	374	0.34	.24	0.36	.23
Systematic risk	342	1.03	.45	0.93	.37
Total risk	342	0.02	.01	0.02	.01
Market/book, equity	369	1.17	.67	1.29	.80
Market/book, assets	368	1.08	.38	1.12	.43
Leverage	368	0.47	.13	0.47	.14
R & D intensity	288	0.02	.02	0.02	.02
Advertising intensity	269	0.02	.03	0.02	.03

[a] See the Appendix for definitions of the variables.

Measures

The study used four continuous measures of diversification, which are formally defined in the Appendix. The first two measure the extent of a firm's diversification across different four-digit SIC industries. One, labeled total diversification 1, is a modified Berry-Herfindahl four-digit SIC count measure in which each business segment is weighted by itself. The other, labeled total diversification 2, is frequently referred to as the entropy measure. First proposed by Jacquemin and Berry (1979), it weights each business segment by the reciprocal of its logarithm, thereby giving proportionally less weight to large businesses. The method used to compute it allows an explicit focus on the extent of four-digit diversification within two-digit industries. Our third measure of diversification uses the same method for computing related diversification. The last measure assesses the extent of diversity among firms' business segments in terms of their sensitivity to the business cycle[1] and to the economic sectors that purchase their products. A previous study (Amit & Livnat, 1988b) showed that this measure captures a unique aspect of unrelated diversification.

In this study, we employed a measure of profits and a measure of variability in profits, or risk, that are based on a cash-flow surrogate, funds from operations. Because it abstracts from many arbitrary accounting allocations,

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[1] The term "business cycle" refers to the observation that aggregate economic time-series such as employment, consumption, and investment undergo repeated fluctuations about a trend. These fluctuations vary in both amplitude and duration but exhibit the same pattern of co-movements among them. The business cycle is commonly measured as deviations from the trend in Gross National Product (GNP) and is described by a stochastically disturbed difference equation of a low order. Deviations by as much as 5 percent are observed in the postwar period.

TABLE 2
Pearson Correlation Coefficients for 1977 and 1982

Variables[a]	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Profits		–21*	–11*	–11*	03	–10*	00	–35*	51*	49*	–47*	19*	20*
2. Profit variability	–03		–06	–08	–09*	–17*	21*	44*	–15*	–16*	21*	02	–20*
3. Total diversification 1	00	–08		97*	39*	55*	02	02	–10*	–08	07	04	–08
4. Total diversification 2	–03	–07	97		38*	55*	02	02	–13*	–10	08	01	–07
5. Related diversification	07	–05	42*	43*		25*	01	01	10*	12*	–07	25*	05
6. Unrelated diversification	–08	–12*	61*	62*	24*		–11*	–10*	–15*	–13*	03	–07	–06
7. Systematic risk	06	07	04	04	08	02		44*	02	05	02	31*	05
8. Total risk	–22*	29*	–06	–06	04	–06	29*		–14*	–16*	44*	02	–18*
9. Market/book, equity	64*	–13*	–04	–07	10*	–16*	13*	–22*		93*	20*	41*	24*
10. Market/book, assets	59*	–14*	–04	–07	09*	–15*	13*	–18*	96*		–28*	45*	28*
11. Leverage	–46*	14*	06	08	–10*	16*	03	33*	–36*	–34*		12*	15*
12. R & D intensity	17*	–06	11*	08	26*	–05	36*	02	32*	34*	–23*		15*
13. Advertising intensity	06	–15*	–01	–02	04	–05	06	–13*	30*	31*	–24*	25*	

[a] Off-diagonal entries reflect two decimal points. Entries below the diagonal are correlation coefficients for 1977. Entries above the diagonal are 1982 correlation coefficients.

* $p < .05$.

this measure is superior to earnings-based measures of profits, which are based on discretionary allocations, and is therefore a relatively purer measure of profits. Since the sizes of the firms studied differed, we scaled funds from operations by total assets at the end of the prior year. Thus, our profit measure is defined as funds from operations during year t divided by total assets at the end of year $t-1$. We defined profit variability as the standard deviation of profits during the period 1977–83.

Market-based measures of return employed in this study, and defined in the Appendix, were (1) the ratio of the market value of the firms' equity to their net worth, labeled market/book, equity, and (2) a proxy for Tobin's q, labeled market/book, assets, and computed as the market value of firms' assets divided by the book value of those assets. Market-based measures of risk were the systematic risk of a firm's equity, or beta, and the total risk as measured by the variability of stock returns.

We examined three operating characteristics. The first was financial risk, which, following R. G. Bowman (1980), we measured as leverage. We also created measures of the advertising and R & D intensity of firms. The Appendix also shows the formulas used for computing these operating measures.

Analysis

Using the K-mean clustering algorithm described in the BMPD Statistical Software Manual (Dixon, 1985: 464–473), we grouped the firms into clusters with similar risk-return characteristics. The algorithm assigns entities into clusters so that those within a cluster are as homogeneous as possible and the clusters are as different as possible. As with any other clustering algorithm, researchers must prespecify the number of clusters. Since no theory specified the appropriate number of clusters, we experimented with two to eight clusters and found that only marginal reductions in the within-cluster variance were obtained with more than four clusters. Therefore, we analyzed four clusters. To obtain those clusters, we first measured firms' return and risk in terms of the cash-flow surrogate and the variability of cash flows, our profit and profit variability measures. After classifying the firms into clusters on the basis of those values, we tested for differences among firms belonging to each of the clusters using one-way analysis of variance. This provided a test of the null hypothesis that all the firms in different clusters will have identical means on a variable. Lack of support for the null hypothesis indicated that the means of at least two clusters differed significantly.

We focused the analysis on three main issues. First, were firms in different risk-return clusters characterized by different diversification strategies? Second, were the differences in risk and return among clusters that were based on accounting measures also reflected in the market-based assessments? Third, since firms in different clusters presumably pursued different operating strategies, did their leverage and the proportion of resources they spent on R & D and advertising differ?

The analysis was performed for a stationary point, 1977, but we also tested whether changes in the risk-return clusters occurred over time. Thus, we compared the variables across clusters seven years later, using another analysis of variance to test for differences in the means of the variables' values in 1982 among the clusters formed for 1977.

RESULTS

Table 3 reports the results of the breakdown of firms into the various clusters for 1977. The first two rows of the table report the mean of each cluster and the number of firms in each cluster for the two variables that were used to form the clusters—the measure of profit and the risk measure, profit variability. We named the clusters high return–high risk, medium return–medium risk, low return–low risk, and low return–high risk. As can be seen, the firms in the first cluster had the highest mean profits among the first three clusters but also the highest risk. The firms in the third cluster had the lowest mean profits among the first three clusters but also the lowest risk. With the lowest returns and the highest risk, the firms in the fourth cluster clearly exhibited performance inferior to that of the firms in the other three clusters. The results of an analysis of variance, shown in the last column of Table 3, indicated that the four clusters did not have identical means.

The next four rows of Table 3 show the results for the four measures of diversification. Firms in the high return–high risk cluster were the least diversified among the first three clusters in terms of total diversification and diversification into unrelated businesses. However, the firms in this cluster were the most diversified into related businesses. Thus, we can characterize firms that have high return–high risk as having diversified into related businesses, possibly to utilize excess capacities and to benefit from economies of scope and other synergies. In contrast, firms that have low return and low risk can be characterized as having diversified into unrelated businesses, thereby reducing their operating risk.

Table 3 also reveals that the differences in related diversification among clusters are not statistically significant, although unrelated diversification does significantly differ across clusters. That difference may be due in part to the different methodologies we employed for the diversification measurements. We measured related diversification by using the SIC-based entropy method but measured unrelated diversification by examining the extent of diversification across economic sectors and into segments and differential responses to the effects of the business cycle. Finally, the means for the diversification measures show that the low return–high risk cluster consisted of firms that are the least diversified in terms of total diversification and related diversification and almost the least diversified into unrelated businesses.

The next four rows of Table 3 show that the market measures of risk and return are generally ordered in the same way that is indicated by the risk and return measures based on the cash-flow surrogate. The results suggested that the means of the market-based measure of total risk differ statistically be-

TABLE 3
Characteristics of Firms in Four Clusters Based on Performance in 1977

	High Return–High Risk		Medium Return–Medium Risk		Low Return–Low Risk		Low Return–High Risk		
Variables	**Means**	***N***	**Means**	***N***	**Means**	***N***	**Means**	***N***	p^a
Basis for clustering									
Profits	0.216	48	0.151	137	0.109	116	0.069	64	.00
Profit variability	0.037	48	0.030	137	0.025	116	0.049	64	.00
Diversification measures									
Total diversification 1	0.463	48	0.502	137	0.529	115	0.433	64	.05
Total diversification 2	0.838	48	0.922	137	0.988	115	0.826	64	.11
Related diversification	0.285	48	0.270	137	0.266	115	0.180	64	.27
Unrelated diversification	0.256	48	0.346	137	0.395	116	0.308	64	.00
Market measures of risk and return									
Systematic risk	1.042	47	1.071	127	0.996	106	1.027	58	.65
Total risk	0.014	47	0.014	127	0.015	106	0.018	58	.00
Market/book, equity	2.047	48	1.323	137	0.903	116	0.668	64	.00
Market/book, assets	1.582	48	1.148	137	0.931	115	0.847	64	.00
Operating measures									
Leverage	0.380	48	0.427	137	0.511	115	0.565	64	.00
R & D intensity	0.022	36	0.017	109	0.015	98	0.012	45	.10
Advertising intensity	0.020	38	0.020	104	0.020	84	0.014	43	.63

[a] Determined by one-way analysis of variance.

tween clusters and that the difference between the means of systematic risk is statistically insignificant. We can explain the second result by noting that a firm's systematic risk reflects both its operating and financial risk. Further, Table 3 shows that the mean value of the diversification measures increases between the first cluster and the third—firms in the low return–low risk cluster are more diversified than those in the high return–high risk cluster. In a recent study (Amit & Livnat, 1988a), we showed that diversification has two major effects on systematic risk that operate in opposite directions and usually offset each other. Diversification, in particular, diversification into unrelated businesses, reduces the operating risk of a firm, which tends to reduce its systematic risk. On the other hand, such diversification enables a firm to increase its leverage, or its financial risk, and consequently increases its systematic risk. The findings reported in that study documented that those two factors are of about the same magnitude, so we concluded that diversified firms trade off operating risk for financial risk. This analysis suggests that systematic risk should not substantially differ among the three clusters of firms with better performance and explains the statistically insignificant result we obtained for systematic risk. Finally, we note that the market-based measures of return, the market-to-book ratios, clearly show the superiority of the firms in the first cluster over those in the other clusters.

The last three rows of Table 3 report the results of different operating decisions in the various clusters. Leverage increases as risk is reduced for the first three clusters. The increased debt capacity of well-diversified firms with low risk may explain that finding. The cluster of firms with inferior performance showed the highest leverage.

The means for expenditures on advertising do not differ significantly across the four clusters. However, the proportion of resources spent on R & D is statistically different across clusters; the higher the return–risk cluster to which a firm belongs, the higher the firm's R & D intensity.

Table 4 reports the mean values of the variables of the firms in each cluster seven years later. We looked at the characteristics of the clusters formed on the basis of data from 1977 in 1982. The results are similar to those for 1977, indicating that few changes took place for the firms studied during that period. Most clusters show a little more diversification, with firms in the third cluster increasing both related and unrelated diversification. The market measure of systematic risk again does not differ among the four clusters, but the market measure of total risk exhibits statistically different means, as do the measures of market-to-book values and leverage.

DISCUSSION AND IMPLICATIONS

This study provided evidence about the risk-return trade-off in individual firms. We showed that most of the firms studied belonged to a group with high return and high risk, to a group with medium return and medium risk, or to a group with low return and low risk. The study provided evidence that related diversification characterizes high return–high risk firms and that such a

TABLE 4
Characteristics of Firms in the 1977 Clusters for 1982

	High Return–High Risk		Medium Return–Medium Risk		Low Return–Low Risk		Low Return–High Risk		
Variables	**Means**	***N***	**Means**	***N***	**Means**	***N***	**Means**	***N***	p^a
Basis for Clustering									
Profits	0.183	48	0.125	137	0.098	115	0.053	64	.00
Profit variability	0.037	48	0.030	137	0.025	116	0.049	64	.00
Diversification measures									
Total diversification 1	0.498	48	0.527	137	0.542	116	0.498	63	.43
Total diversification 2	0.916	48	0.971	137	1.015	116	0.928	63	.45
Related diversification	0.278	48	0.271	137	0.310	116	0.180	63	.09
Unrelated diversification	0.286	48	0.349	137	0.415	116	0.321	64	.00
Market measures of risk and return									
Systematic risk	1.022	48	0.909	129	0.908	111	0.982	60	.18
Total risk	0.022	48	0.021	129	0.022	111	0.026	60	.00
Market/book, equity	1.991	48	1.381	137	1.096	116	0.984	64	.00
Market/book, assets	1.493	48	1.171	137	1.012	116	0.975	61	.00
Operating measures									
Leverage	0.391	48	0.430	137	0.497	116	0.572	61	.00
R & D intensity	0.032	32	0.024	94	0.023	82	0.018	35	.08
Advertising intensity	0.020	43	0.019	121	0.020	103	0.012	52	.46

[a] Determined by one-way analysis of variance.

strategy also yields great market risks and market-to-book values. Low return–low risk firms are usually unrelated diversifiers, with relatively lower market risks and lower market-to-book ratios.

Although this study showed differences in the risk-return characteristics of firms, we do not and cannot claim that one set of characteristics is better than the others without an explicit knowledge of the risk preferences of shareholders of specific firms. We found that some firms choose to reduce risk at the expense of incurring a low return, and others assume high risk in order to obtain a high return. Of course, the strategy that a firm follows to attain its desired risk-return trade-off is formulated by its directors and managers. To the extent that managers have a large human investment in their firms, they may find it advantageous to reduce firm-specific risk and engage in unrelated diversification that may reduce the return but also the risk (Amihud & Lev, 1981). The range of such managerial decisions depends, among other things, on the control owners have over managers and the owners' ability to align managers' interests with their own.

Firms that choose to diversify into related areas may do so to use excess capacities in input factors, managerial talents, or other resources, such as distribution channels. The extent of such diversification depends on market failures in establishing other mechanisms to employ excess capacities and resources (Teece, 1980, 1982). Managers expect the use of excess resources through diversification to increase return, but the exposure of a firm to business risk also increases because the areas into which firms diversify are usually close to their core businesses.

Although this study cannot recommend a best diversification strategy, it does provide evidence that the firms we studied were not able to simultaneously increase their return and reduce their risk. It also showed that firms with a low risk tend to increase their leverage, possibly to make use of their increased debt capacity and the associated tax benefits of interest deductibility. However, the study also documented the existence of firms with inferior performance that are not well-diversified and have high financial leverage as well as unfavorable risk-return characteristics. Such firms may consider modifications in their diversification policies, reduction of debt, or both in order to improve their risk-return characteristics. The study did not find radical changes between 1977 and 1982 in the performance of the firms studied. That lack of change may indicate that firms do not make extreme changes in their composition over such a length of time, or that they continue to follow the same diversification patterns. Finally, we found that the market measures of return and risk corresponded to the accounting measures that served as the basis for the clustering procedure. Among the four clusters, market risk and the market measure of return were lowest for the low–risk return cluster, and market risk and the proxy for Tobin's q, the market-to-book measure of assets, were the highest for the high risk–high return cluster.

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APPENDIX

Diversification Measures

Total diversification. The first measure, total diversification 1, is a slightly modified Berry-Herfindahl index based on four-digit SIC industry groups. We computed it using the following: $1-(\Sigma_j s_j^2)/(\Sigma_j s_j)^2$, where s_j is the share of a firm's total sales to the j^{th} SIC industry group. The denominator of this measure, which was also adopted by Montgomery (1982), may deviate from unity when total firm sales differ from the sum of the segments. This may be the case when some of a firm's sales cannot be identified within any SIC industry group.

Our second measure of total diversification, frequently referred to as the entropy measure, was proposed by Jacquemin and Berry (1979). It weights each share, s_j, by the logarithm of $1/s_j$, thereby giving proportionally less weight to large businesses. We labeled the measure total diversification 2 and computed it as $1-\Sigma_j s_j \ell n(1/s_j)$.

Related diversification. Following Palepu (1985), we computed a measure of related diversification in two steps: $DR_k = \Sigma_{j\epsilon k} s_j^k \ell n(1/s_j^k)$, where s_j^k is the proportion of total sales in a two-digit SIC industry k made by a segment, with a four-digit SIC industry code j, that is the same broad two-digit industry k. DR_k measures the extent of diversification into four-digit SIC industries for a given two-digit industry k. We then measured related diversification as $\Sigma_k DR_k S^k$, where S^k is the proportion of consolidated sales made in the two-digit SIC industry k.

Unrelated diversification. Our goal was to construct a measure that would allow us to capture the extent of diversification across economic sectors and into segments with differential responses to the effects of the business cycle. Firms that want to reduce their operating risk through diversification need to consider those environmental factors which are beyond the control of management. Thus, to facilitate the linkage between the firms' business segments and key aspects of the business-cycle phenomenon, we performed the following procedure. We identified the economic sector that purchased most of the output produced by the segment. We considered five broad GNP sectors that are commonly referred to: consumer nondurables, consumer durables, services, fixed business investments, and government. We then identified each segment as leading, lagging, or coincidental with economic cycles by correlating each segment's sales with (1) the index of lagging economic indicators, (2) the index of coincidental economic indicators, and (3) the index of leading economic indicators. We thus identified segments as lagging, coincidental, or leading business cycles depending on which correlation was the highest among the three. Next, we assigned each segment to 1 of the 15 combinations that result from the products of the five broad economic sectors and the three economic indicators. We summed the data for all segments with the same combination (a number between 1 and 15) and treated the result as one segment or "industry." Finally, we computed the unrelated diversification measure as $1-(\Sigma_j s_j^2)/(\Sigma_j - s_j)^2$, where s_j represents the proportion of total sales made by businesses with the same combination of economic sector and business cycle indicators.

Market-based Measures of Risk and Return

Systematic risk (beta). The systematic or relative risk of a firm was estimated using an ordinary least squares regression of the form: $R_{jt} = \alpha_j + \beta_j R_{mt} + \epsilon_{jt}$, where R_{jt} is the return on the security of firm j on day t, and R_{mt} is the equally weighted market return on that day. The period used to estimate the systematic risk includes the 252 trading days for each year. Missing observations were deleted as well as the observation on the day following the missing data day.

Total risk. We estimated total risk as the standard deviation of daily returns over the same period we used to compute betas.

Market/book, equity. This measure was computed as the market value of equity at the end of year t divided by net worth at the end of year t.

We calculated market value by multiplying the price per share at year's end by the number of shares outstanding. Net worth was the total assets minus total liabilities at year's end.

Market/book, assets. As a proxy for Tobin's q we used the market value of equity plus the book value of debt at the end of year t divided by total assets at the end of year t.

We used the book value of debt in lieu of its market value in the numerator since the market value of debt is available just for a small fraction of outstanding debt. However, this is not a bad approximation, in light of R. G. Bowman's (1980) results.

Operating Measures

Leverage. This measure uses the book value of total debt at the end of year t over total assets at the end of year t.

Advertising intensity. We divided advertising expenses in year t by sales in year t to obtain this measure.

R & D intensity. This measure represented R & D expense in year t divided by sales in year t.

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DIVERSIFICATION STRATEGY AND SYSTEMATIC RISK: ANOTHER LOOK

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Recently, researchers in business policy have become interested in exploring the relationship between corporate diversification strategy and systematic, or market, risk. A desire to understand the effects of diversification strategy on the market value of firms motivates this interest. Since the market value of a firm is a function of its financial return, given the level of its systematic risk (Fruhan, 1979), knowledge of the nature of this relationship is important to top managers who embrace the maximization of shareholders' wealth as an important goal. From a practical standpoint,

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achieving the optimal stock price also helps to discourage unfriendly takeover attempts, which can result in unwanted distraction of a firm's top management and disruption of the firm's operations.

The results reported in the few studies published to date suggest that systematic risk differs among firms with different types of diversification strategies. What is not clear from the studies is why that is so. Systematic risk is the result of investors' expectations about the future volatility of a firm's total return relative to that of the market as a whole. Is there some intrinsic, direct effect of strategic type on investors' perceptions of a firm's market risk, or do investors merely react to a firm's financial context to assess systematic risk, regardless of strategy? The purpose of this study was to use both strategic management and financial theory and research to empirically address that question.

PREVIOUS RESEARCH

Montgomery and Singh (1984) were the first strategy researchers to explore the relationship between diversification strategy and systematic risk. On the basis of a review of the empirical literature on finance, they determined that (1) conglomerate firms and conglomerate-type merger activity results in higher systematic risk (Joehnk & Nielsen, 1974; Melicher & Rush, 1974) and (2) conglomerate firms tend to have higher financial leverage (Melicher & Rush, 1974; Weston & Mansinghka, 1971). Drawing on selected financial theory, Montgomery and Singh further pointed out that debt in a firm's capital structure is expected to positively affect systematic risk (Hamada, 1972) and increasing monopoly power and capital intensity may be expected to reduce it (Subrahmanyam & Thomadakis, 1980).

Given this background, Montgomery and Singh argued that unrelated diversifiers, or conglomerates, may have higher-than-average systematic risk because of characteristically high debt levels, low market power, and low capital intensity. Using one-way analysis of variance, they confirmed previous research findings indicating that unrelated diversifiers have significantly higher systematic risk than other types of firms. However, their exploratory analysis did not determine if diversification strategy was significantly correlated with systematic risk when other posited causes like debt, market power, and capital intensity were controlled.

In the other published study of strategy related to this topic, Lubatkin and O'Neill (1987) argued that related diversification, because of its ability to achieve relative competitive advantage, may reduce systematic risk. Conversely, they suggested that unrelated diversification contributes little to competitive advantage and therefore may actually increase systematic risk. In effect, they focused on posited fundamental differences in market power as the reason for expecting lower systematic risk for related diversifiers and higher systematic risk for unrelated diversifiers.

To test their hypotheses, they looked at 169 mergers over a 20-year period (1954–73). Their findings supported a significant reduction in postmerger systematic risk for related mergers but, unlike the Montgomery and Singh (1984) results, provided no support for higher systematic risk from unrelated acquisition. However, like Montgomery and Singh, Lubatkin and O'Neill did not control for other possible sources of systematic risk in their study. Thus, although they discovered some differences in systematic risk between related diversifiers and all the other strategy types, the underlying reasons for the differences remain problematic.

To summarize, it is unclear from extant research whether diversification strategy has a direct effect on systematic risk, or if the effects are the result of investors' assessments of underlying financial differences inherent in the different types of firms or of some combination of the two.

Borrowing from the previous research, I framed the following hypothesis to address this question.

> *Hypothesis 1: Diversification strategy does not affect systematic risk, with other possible causes controlled.*

The other possible causes selected for this study were capital intensity, monopoly power, and financial leverage. The rationale for use of those variables comes from their use in previous financial research and in Montgomery and Singh (1984).

METHODS

Measures

Diversification strategy. As did Montgomery and Singh (1984), I used Rumelt's (1974) categories of corporate diversification strategy. In addition to offering the obvious advantage of comparability with Montgomery and Singh's study, these strategy groups displayed significant differences in financial characteristics (Rumelt, 1974).

Market power. The measure selected for market power was the average return on assets (ROA) over the period of the study, a profitability measure. ROA has been shown to correlate with systematic risk (Logue & Merville, 1972) and with diversification strategy (Rumelt, 1982). Moreover, excess profit, or monopoly rent, is directly associated with monopoly power. Thus, ROA seemed a particularly appropriate measure. It would have been desirable, however, to include the weighted market share measure used by Montgomery and Singh for the sake of comparability. Unfortunately, such data were not available for the period of this study, 1970–74. Although this lack of comparability is a limitation, neither ROA nor weighted market share is a clearly superior operational definition of the multidimensional monopoly power construct.[1]

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[1] Weighted market share has long been used as a surrogate for market (monopoly) power in research on industrial organizational economics. However, ROA has also been used to reflect monopoly power in research on both strategy and finance (e.g., Bettis, 1981; Logue & Merville, 1972). The problem is that both measures are imperfect representations of an unobservable construct. For example, ROA may derive from monopoly power, but may also be influenced by operational efficiency. As for weighted market share, it does not imply monopoly power in all market situations. It is thus arguable which measure best represents monopoly power.

Capital intensity. The measure selected for capital intensity was the ratio of the average value of net fixed assets to total book assets over the period of the study. A previous study (Barton, 1985) showed that this measure of capital intensity is significantly correlated with Rumelt's strategy categories.

Financial leverage. The measure selected to represent financial leverage was the average ratio of owner's equity to invested capital. I chose this measure because it has been shown to correlate with Rumelt's strategy categories (Barton, 1985; Rumelt, 1974). It is important to note, however, that the measure is a ratio of equity to total capitalization, and not of debt to capitalization. Thus, the lower the value of this variable, the higher the debt level, or financial leverage, and vice versa. As a result, an increase in this variable should result in a decrease in systematic risk (Hamada, 1972).

Firms, Time Period, and Sources of Data

The firms used for this study came from the 1974 *Fortune* 500 list of industrial companies. Of the 500 firms, 276 had financial data available on COMPUSTAT data tapes and had not changed strategy classification over the study period.

Following the approach of other strategy and finance studies (e.g., Barton, 1985; Bettis, 1981; Christensen & Montgomery, 1981; Montgomery & Singh, 1984), I conducted a cross-sectional study covering a five-year time period, 1970–74. The five-year span helped to mitigate the effects of unusual events and to homogenize the effects of swings in the economy. Using 1970–74 took advantage of Rumelt's (1978) classifications of firms' strategies for this period. To maximize the number of firms studied, I used annual reports and Security and Exchange Commission 10-K reports to classify 143 firms in addition to the 133 available from Rumelt. Data on systematic risk were obtained from the *Value Line Investment Survey* (1974).

RESULTS

Table 1 displays the means for all the financial variables by strategy category. The results support Montgomery and Singh's (1984) proposition that, compared to other firms, unrelated diversified firms have significantly higher systematic risk, as well as low market power, low capital intensity, and high debt.

Table 2 contains means, standard deviations, and intercorrelations for all variables. The data reveal a significant ($p<.001$) correlation of systematic risk with each financial variable. The correlation of the financial variables with both strategic type and systematic risk in this data affirms the need to statistically control for the relationships of financial variables with market risk in studying the relationship between diversification strategy and systematic risk. I met that need with an analysis of covariance (ANCOVA).

In order to assess if differences in relationships occurred among strategy categories, a full interactive ANCOVA model was constructed. The model

TABLE 1
Means, Standard Deviations, and Significance Levels Across Diversification Strategy Groups[a]

Variables	Single $N = 26$	Dominant $N = 71$	Related $N = 119$	Unrelated $N = 60$	F[b]	Post hoc differences[c]
Systematic risk	1.04	1.03	1.07	1.19	7.19***	Single-unrelated
	(.19)	(.23)	(.18)	(.26)		Dominant-unrelated
						Related-unrelated
Profit	.167	.110	.127	.104	8.11***	Single-dominant
	(.10)	(.05)	(.06)	(.05)		Single-related
						Single-unrelated
Capital intensity	.399	.467	.355	.297	21.0***	Single-unrelated
	(.14)	(.16)	(.11)	(.11)		Dominant-unrelated
						Related-unrelated
						Dominant-related
Financial leverage[d]	.789	.655	.699	.617	10.18***	Single-dominant
	(.16)	(.14)	(.14)	(.15)		Single-related
						Single-unrelated
						Related-unrelated

[a] Groups are based on Rumelt's (1974) diversification categories. Single = single business, dominant = dominant business, related = related diversification, and unrelated = unrelated diversification. Standard deviations are in parenthesis.

[b] F-tests are from ANOVAs.

[c] Values are pairwise comparisons of significantly different means, with $p < .05$, based on a Scheffé test.

[d] Larger values imply lower levels of debt.

* $p < .05$
** $p < .01$
*** $p < .001$

included all financial metric variables, dummy variables representing each strategy category, and interaction terms for all financial variables multiplied by all dummy variables for strategy, as independent variables. (Table 2 contains all the variables in this model, including the interactive terms.) Because the interactive terms added significant explanatory power ($p<.05$) beyond that provided by the additive model, I used the interactive model to evaluate the hypothesis.

Table 3 contains the results obtained with the interactive model. Interaction effects cause the differences in coefficients across strategy categories. This table shows the absolute significance of each coefficient for each category and the significance of the differences of coefficients between categories. I obtained these results by running the complete interactive model four sepa-

TABLE 2
Means, Standard Deviations, and Intercorrelations for All Variables[a]

Variables[b]	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Systematic risk	1.09	.22																			
2. Profit	0.12	.06	–27																		
3. Capital intensity	0.37	.14	–29	–07																	
4. Financial leverage	0.68	.15	–31	60	–09																
5. Single	0.09	.29	–07	23	05	23															
6. Dominant	0.26	.44	–14	–11	38	–08	–19														
7. Related	0.43	.49	–04	08	–12	11	–28	–52													
8. Unrelated	0.22	.41	26	–15	–29	–22	–17	–31	–45												
9. Profit × single	0.02	.06	–11	47	05	30	84	–16	–23	–14											
10. Profit × dominant	0.03	.06	–16	05	30	01	–17	90	–46	–28	–15										
11. Profit × related	0.05	.07	–11	38	–13	29	–24	–44	85	–39	–20	–40									
12. Profit × unrelated	0.02	.05	13	04	–27	–08	–15	–28	–40	88	–13	–25	–34								
13. Capital intensity × single	0.04	.12	–10	22	15	21	94	–18	–26	–16	79	–16	–22	–14							
14. Capital intensity × dominant	0.12	.22	–15	–13	55	–08	–17	93	–48	–29	–15	82	–41	–26	–17						
15. Capital intensity × related	0.15	.19	–10	04	09	05	–25	–48	92	–42	–21	–43	77	–37	–24	–44					
16. Capital intensity × unrelated	0.06	.13	18	–15	–14	–24	–16	–29	–42	93	–13	–26	–36	80	–15	–27	–39				
17. Financial leverage × single	0.07	.23	–08	29	05	29	98	–19	–27	–16	89	–17	–23	–14	92	–17	–25	–15			
18. Financial leverage × dominant	0.17	.30	–19	–07	37	03	–19	97	–50	–30	–16	93	–43	–27	–18	89	–46	–28	–18		
19. Financial leverage × related	0.30	.35	–07	18	–14	26	–27	–50	97	–44	–23	–45	91	–38	–25	–47	87	–41	–26	–49	
20. Financial leverage × unrelated	0.13	.26	20	–09	–30	–08	–16	–30	–43	96	–14	–27	–37	91	–15	–28	–40	87	–16	–29	–42

[a] Decimal points are omitted.

[b] Single = single business, dominant = dominant business, related = related diversification, and unrelated = unrelated diversification.

TABLE 3
Results of ANCOVA Analyses of the Effects of Variables and Interaction Terms on Systematic Risk[a]

	Strategic Categories[b]			
Explanatory Variables	Single Business	Dominant Business	Related Diversifiers	Unrelated Diversifiers
Constant	1.18*** Unrelated**	1.47*** Unrelated*	1.48*** Unrelated*	1.88*** Dominant,* related,* single**
Profit	−.73	.06	−.40	−1.26*
Capital intensity	−.36	−.11 Unrelated**	−.50***	−.92*** Dominant**
Financial leverage	.15 Dominant*	−.60*** Single*	−.25	−.47**
R^2 = .28				
F = 6.58***				

[a] Result of running full interaction model to obtain regression results for each strategy category.

[b] Strategic categories shown in the body of the table represent differences in coefficients between categories and the significance of that difference. For example, the effect of capital intensity on systematic risk is significantly different at the .01 level between the unrelated and dominant categories.

* $p < .05$
** $p < .01$
*** $p < .001$

rate times, with a different strategy category acting as the implicit dummy each time.[2]

The results shown in Table 3 do not support the null hypothesis. First, significant differences between the constant terms suggest there is a fundamentally higher positive relationship between a strategy of unrelated diversification and systematic risk than between other strategies and systematic risk, with financial context controlled. Second, the significant interactive effects shown in Table 3 suggest that the relationships of the financial variables with systematic risk are contingent on which diversification strategy a firm is pursuing. It appears that a firm's strategy may indeed affect investors' perceptions of the firm's market risk.

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[2] Analysis of covariance can be thought of as a multiple regression with dummy variables. In this study, strategy was included as a nominal variable and financial contextual variables as metric variables. Two points should be made with respect to this analysis. First, to determine whether the full interactive model or the additive model best represented the relationship between the independent and dependent variables, both were run. Using explained sums of squares and appropriate degrees of freedom from both estimated models, I conducted an F-test, which established that the interactive terms as a group were able to explain significantly more variation of the systematic risk dependent variable than the additive model by itself ($p < .05$).

Second, in order to run such an analysis, a dummy variable representing a strategy category must be absent to allow estimation of the coefficients (Hanushek & Jackson, 1977). One result is that any single regression of this type results in tests of significance between the individual coefficients of the implicit strategy category and all the coefficients of included strategy and strategy-financial interactive variables. Thus, a single regression cannot yield significance tests of the differences among coefficients of included strategy and strategy-financial variables. I therefore ran the ANCOVA model four separate times.

As for the hypothesized relationships between financial variables and systematic risk, capital intensity is consistently negatively related to systematic risk for all strategy categories, as predicted by Subramanyam and Thomadakis (1980), although the relationship is not significant in all categories. Also as predicted (Hamada, 1972), increasing values of the financial leverage variable are related to decreasing market risk in those categories in which it is significant. The negative relationship of profit (monopoly power) to systematic risk is as expected (Subramanyam & Thomadakis, 1980) in all categories but dominant firms, where it is not significantly different from zero.

DISCUSSION

The results reported here suggest that a firm's diversification strategy may convey information to investors about its future market riskiness over and above that provided by the firm's specific financial and market condition.

For example, a possible reason for the high fundamental level of systematic risk associated with unrelated diversified firms may be investors' disillusionment with the future potential of that type of firm *during the period* studied. In the 1960s, unrelated firms (conglomerates) grew much more rapidly than other types of firms and enjoyed favorable stock price/earnings ratios (Rumelt, 1974). However, during the period of this study, conglomerate growth rates declined substantially (Barton, 1985) along with their stock valuation (Forbes, 1974). Thus, one possible explanation of this result is that investors were wary of the market risk of conglomerates but were willing to reduce their assessment of market risk if a specific firm showed high profitability, low debt, and high capital intensity, conditions that implied high entry barriers for its businesses.

What this study's results may suggest is that investors react to the prospects for a particular diversification strategy on the bases of their recent historical perspective and their assessment of the ability of such a strategy to deal with an expected future environment. If that conjecture is true, it might help explain why Lubatkin and O'Neill (1987) found that firms making related mergers achieved significant reductions in systematic risk after a merger despite increased debt levels.

First, since their study primarily covered the period of the 1950s and 1960s, a totally different set of environmental circumstances than those relevant to the present study's time period, 1970–74, or to Montgomery and Singh's time period, 1974–78, would have influenced investors' perceptions of the market riskiness of diversification. Thus, significant differences in relationships between strategy, financial context, and market risk for firms in Lubatkin and O'Neill's period might have resulted.

Second, if the relationships were as found in this study, debt would have had no significant positive effect on systematic risk for a related diversified firm. However, if an acquiring firm added to its capital intensity with an acquisition, significantly lower market risk would be the result.

CONCLUSIONS

Although the cross-sectional nature of this study precludes claims of cause and effect, the results presented suggest that the diversification strategy selected by top management may influence the systematic risk of a firm either directly or by modifying the effects of financial context.

From the standpoint of the practitioner who wishes to maximize stock value, this finding implies that investors may reward some strategies fundamentally more than others and may regard certain underlying financial characteristics as more important than others in assessing market risk, depending on the strategy. Unfortunately, much more work needs to be done before definitive prescriptions to managers can be made.

From the standpoint of future research, the results suggest a need to explore the relationships studied here in different time periods, to evaluate stability and to employ longitudinal research designs to test for causal relationships. Only then can appropriate prescriptions for managerial action be made.

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LENGTH OF EXPERIENCE AND THE PERFORMANCE OF MANAGERS IN THE ESTABLISHMENT PHASE OF THEIR CAREERS

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In many organizations, the length of employees' experience is a key factor affecting decisions about the management of human resources, including selection, retention, and promotion decisions (Mills, 1985). During periods of consolidation, for instance, employees with more tenure are frequently retained and those with less are laid off. Underlying many personnel decisions is the assumption that individuals who have been in one or more positions with a company longer than other employees are more productive. They have a record of past success and cumulative business savvy that makes them tangibly more valuable to a company. Advocates and opponents of this view of the effects of experience on productivity have made assertions and counter-assertions, but empirical evidence is scant. In the words of Schmidt, Hunter, and Outerbridge, "Little systematic research has been de-

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voted to the potential effect of job experience on job performance" (1986: 432).

Two path analytic studies of nonmanagerial employees have found a positive correlation between experience on the job and supervisory ratings of performance (Schmidt et al., 1986) and work samples (Hunter & Hunter, 1984). However, other researchers have reported either a negative correlation (Fiedler, 1970), a positive correlation (Terborg & Ungson, 1985), or no correlation (Medoff & Abraham, 1980) between the experience of managers and their performance. This inconsistency among results is not surprising, for researchers have measured managers' experience in terms of their time with an organization, time in a position, and time in a current location, and have occasionally averaged the organizational tenure of several managers.

The nature of the relationship, if any, between length of experience and performance probably depends on whether experience is measured as organizational tenure, job tenure, or years of experience at a particular site. It is conceivable, for instance, that managers with more organizational tenure might demonstrate a higher level of performance than those with less service and that managers who have been in their current position for a protracted period might demonstrate a lower level of performance than their less experienced counterparts (Hise, Kelly, Gable, & McDonald, 1983). Schmidt and colleagues (1986) suggested that it is experience on a specific job, not general experience in a field, experience on related previous jobs, or experience in work settings that increases employees' performance because it provides the opportunity to acquire job knowledge and skills. To date, no one has examined the relationship between managerial performance and multiple measures of experience in order to test the hypothesis that job experience counts.

On the basis of the results of studies with nonmanagerial employees in the military, Schmidt and colleagues (1986) also proposed that the causal effect of differentials in job experience is greatest at intermediate levels of mean job experience (e.g., 2–5 years). They noted that when the mean job-experience level among employees is very high, a reduction in the relative inequality of experience is likely to lower the correlation of experience with performance. At extremes, the process of increasing the relative equality of experience would theoretically push the correlation between experience and performance toward zero. That phenomenon may account for the low value of correlations reported in previous research. Field studies of managers have typically focused on supervisors with substantial job and organizational longevity—typically, more than a decade. No research has examined the effects of experience on the performance of individuals who are neither totally inexperienced managers nor long-term job incumbents. The present study concentrated on managers in the early stages of their careers.

Moreover, this study did not examine the potential effects of experience on supervisory ratings or work samples, as previous research has; rather, it examined the effects of experience on actual performance—sales and profits achieved. A work-sample simulates important tasks or sets of tasks of a job and tests "how well an incumbent *can* perform a task under standardized, idealized circumstances; it is not a test of how well he or she actually does it" (Guion, 1983: 268). Supervisory ratings test how well an employee actually does a job, but their use also has drawbacks. There is evidence that factors other than performance account for a very large part of the variation in performance ratings (Hunter, 1983). Employees' records of organizational tenure or length of time in a job may contaminate performance ratings. If raters' opinions regarding the merits of more or less experience affect their judgments of managers' performance, the results of research using performance ratings would be distorted. For this reason, I used objective measures of performance in this study.

In order to obtain more unambiguous evidence than has been available from earlier studies with which to determine whether there is a relationship between the length of job experience and the performance of early-career managers, I incorporated two additional features in the research design. First, variables that typically covary with the duration of employment and could influence the contribution an individual makes to an organization were statistically controlled. Gordon and Johnson (1982) indicated that failure to control for age and other variables that covary with length of service has been a serious shortcoming of studies on organizational seniority. The same reasoning would apply to examinations of the relationship between performance and managers' length of experience on the job or their length of time at a particular site.

Second, it is entirely possible that the low correlations reported in previous research were due to neither the extreme longevity of the managers studied nor the measures of experience employed but to very small sample sizes. For example, Fiedler (1970) found a median correlation of −.12 between experience and performance in 11 different sets of data from five organizations. However, in 10 out of 11 cases the probability was less than one of three that the statistical test would reveal a significant relationship, owing to lack of power (Cohen & Cohen, 1975). The size of the data set in the current study provided sufficient power to test the hypothesis that length of job experience is a significant predictor of job performance among managers who are in the establishment phase of their careers.

In sum, the present study was conducted in order to determine whether there is a relationship between the job experience of early-career managers and the performance they achieve. Length of experience serves as a legal defense in hiring, promotion, and layoff decisions, as evidenced by two recent Supreme Court decisions—a 1984 case, *Firefighters Local Union No. 1784* v. *Stotts*; and a 1986 case, *Wendy Wygant et al.* v. *Jackson Board of Education* (Wermiel, 1986a, 1986b). In addition, it has a potentially major effect on the short- and long-term productivity of a firm. Thus, it is important to obtain more empirical evidence regarding its potential effect on the actual performance managers achieve. In the current study, I hypothesized that early-career managers with more experience in a role, longer time in their current location, and more seniority with a company would achieve greater sales and higher profits than those with less experience in a role, less time in their current location, or shorter tenure with a company. Furthermore, I anticipated that length of experience as a manager would be a better predictor of performance than would the duration of their employment with a company or the length of time they had managed their current site.

METHODS

Respondents

Eighty-nine restaurant managers in an international restaurant company served as respondents. The majority were men (95%) and white (81%). Twenty-one percent had a college degree or education beyond a college degree. Their mean age was 33.3 years. On average, the managers had been employed by the company almost five years, had been managers of a restaurant for about three years, and had managed their current restaurant for nearly two years. Their average annual compensation was about $45,000. All had previously been assistant restaurant managers and had averaged about a year in that position.

Procedures

This research was part of a larger study of managerial promotions that I conducted for the restaurant company, serving as an external consultant during the course of the project. Performance data were obtained from the company's accounting reports. Data on managers' characteristics and work experience were gathered from questionnaires distributed to them nationwide and returned directly to me. The questionnaire required approximately 45 minutes to complete. Managers, who were assured of the confidentiality of their responses, had the option not to participate. A small percentage exercised that option; the return rate was 83 percent. Before its distribution across the country, I pretested the survey with 17 individuals who worked for the company in the field or at corporate headquarters and revised it. Each of the individuals in the pilot study also participated in a structured interview lasting about an hour.

Measures

Three different measures of experience were used to predict the restaurant performance managers achieved: length of time with the organization, length of time as a restaurant manager, and length of time managing the current unit. I measured age, education, and length of time as an assistant manager as control variables. Performance was assessed in two ways: the sales increases achieved by managers and the profits their restaurants realized for the year. Those were the most important indices of performance the company used to evaluate restaurant managers.

In addition, several variables that provided a picture of the responsibilities, attitudes, and movement of managers within the organization were included. I obtained data on the size of restaurants, indexed by number of employees; managers' intentions to remain with the firm; the perceived importance of seniority in the staffing of restaurants; and the nature of managers' jobs. I collected the latter through a follow-up survey completed by a subset of the respondents ($N = 60$) three months later. Information on the nature of the jobs was particularly important in view of the possibility that situational constraints and demands might inhibit the potential effects of experience on performance (Peters & O'Connor, 1980).

Five dimensions of managers' job were of interest: whether they were expected to follow written rules and procedures, carried out the same activities in the same way repetitively, could actually rely on established practices in doing the work, were authorized to solve problems not covered by rules and procedures, and participated in decisions regarding what, how, and when to accomplish activities. I adapted measures of each dimension from scales created by Fry and Slocum (1981). The Appendix provides details on the indices. Since each of the individuals carried out the same role in the company, I anticipated no substantial variation in managers' descriptions of their job or in the job itself. However, the levels of these dimensions were expected to provide a clue about the amount of flexibility managers had to affect the performance of their restaurants and the extent to which they had the opportunity to exercise individual knowledge and skill (Stewart, 1982).

Analyses

Hierarchical and stepwise multiple regression analyses were used to examine the relationship between length of experience and performance, with the potential effects of age, education, and experience as an assistant manager controlled. The variables were entered into the prediction equation in the following manner. First, age, education, and length of service as an assistant manager were entered stepwise as a block in order to determine the incremental and unique contribution of experience over and above other variables that typically covary with employment duration. Then, the three measures of experience were added stepwise in order to determine which dimensions of experience, if any, would add a significant increment to the prediction of performance.

RESULTS

Table 1 shows correlations among the variables. With the exception of the relationship between managerial experience and performance, zero-order correlations between the predictor variables and performance were generally low. The three indices used to operationally define length of experience were significantly intercorrelated. There was also a strong relationship between the sales and the profits achieved by restaurant managers.

Table 2 presents results of the regression analyses. Age, education, and length of time as an assistant manager explained 12 percent of the variance in sales and profits achieved. Among the multiple measures of tenure, job experience alone contributed a unique and significant increment in predicting the sales and profits realized by managers after the predictive value of age, education, and amount of time as an assistant had been assessed. The

TABLE 1
Descriptive Statistics and Intercorrelation Matrix[a]

Variables	Means	s.d.	1	2	3	4	5	6	7
1. Age	33.31	7.90							
2. Education	14.02	1.82	26**						
3. Time as assistant manager	1.16	0.93	−36***	−10					
4. Tenure with organization	4.81	2.58	08	−08	03				
5. Tenure as restaurant manager	2.17	2.84	27**	04	26**	69***			
6. Tenure managing current restaurant	1.86	1.57	34***	−04	−05	53***	64***		
7. Restaurant's profit	98,739.00	51,506.00	35***	17	−26**	30**	50***	19	
8. Restaurant's sales increase	28,916.00	43,367.00	38***	17	−21	24	50***	26**	77***

[a] N = 89; decimal points omitted.
** $p < .01$
*** $p < .001$

TABLE 2
Results of Multiple Regression Analyses

Steps and Predictors of Performance	Betas	R^2	ΔR^2	F
(a) Sales increase				
1. Length of service as an assistant manager	.00	.04	.04	
Education	.06	.05	.01	
Age	.23	.12	.06	2.68
2. Length of experience[a]				
As a restaurant manager	.54	.30	.17	5.94***
With company				
Managing current restaurant				
(b) Profits				
1. Length of service as an assistant manager	−.04	.05	.05	
Education	.22	.11	.06	
Age	.20	.16	.04	3.54
2. Length of experience[a]				
As a restaurant manager	.45	.35	.19	7.23***
With company				
Managing current restaurant				

[a] Neither length of experience managing current restaurant nor with the company added a significant increment to the prediction of performance.

*** $p < .001$

equation predicting sales achieved by managers that included the three control variables and job experience resulted in an R^2 of .30. When the three control variables and length of job experience were regressed on the profits realized by managers, an R^2 of .35 emerged. Neither length of time with the company nor the length of managers' experience at their current site entered into the prediction equation because each failed to add a significant increment to the explained variance.

DISCUSSION

This study yielded evidence of a strong, positive relationship between the length of job experience among early-career managers and their performance. Those with longer tenure in the role of restaurant manager achieved higher sales and realized larger profits. The relationship between performance and experience apparently depends on the dimension of experience considered. Managerial experience predicted greater sales and profits. However, the amount of time an individual had managed a particular restaurant or worked with the organization were not significant predictors compared to length of time as a manager. Thus, it is important that future research differentiate among tenure in an organization, in a position, at a location, in an industry, and so forth when examining the effects of experience on employee turnover, satisfaction, performance, or other indices of the effectiveness of human resource management.

The contextual information about the job responsibilities, movement, and attitudes of the managers suggested that the observed relationship between length of job experience and performance did not occur because the company assigned individuals with greater job longevity to larger, more successful restaurants nor because it aggressively fired poor performers during a trial employment period. Company officials indicated that they use a "warm body" approach to staffing. Nevertheless, in order to empirically refute or sustain the possibility that the company placed more experienced managers in larger restaurants, I computed the correlation between restaurant size, as indexed by number of employees, and experience. No significant relationship was obtained. Further, managers' observations regarding the absolute and relative importance of seniority in staffing decisions were examined. On a scale ranging from 1 = not important to 5 = very important, the mean value of tenure, or length of service as a restaurant manager, was 2.35. Managers' perceived employment duration was less important than ten other bases for staffing decisions, including performance, ability, loyalty, cooperation, and innovation.

Data to empirically confirm that the company did not aggressively dismiss poor performers were not available. However, such action would be inconsistent with its self-described approach to staffing. Although the company did not aggressively fire those who were poor performers during a trial employment period, it is conceivable that experience predicts performance because those who excelled decided to remain with the organization whereas those who did not quit. In order to examine this possibility, I computed intercorrelations between experience, performance, and managers' intentions to remain. There was no significant relationship between any of the experience measures and intention to remain with the company. There was also no significant relationship between the sales or profits managers achieved and their intention to remain with the company.

Advocates of human capital theory would argue that as managers in the establishment phase of their career gain experience, they gain greater mastery of management. More experienced managers know what it takes to increase sales and realize a profit. Kotter (1982) and Boyatzis (1982) discussed the challenges involved in determining the kind and amount of knowledge characteristic of successful managers. There is no easy way to assess the specialized job knowledge and skills of restaurant managers. Quizzing them on the application of operating policies, procedures, and so forth may provide an insight into their level of job knowledge, but there is little incentive for a company to do so when it is simply concerned with results. Sales and profits are the ultimate test.

It is entirely possible that some unknown third variable is responsible for the correlation between the length of managers' job experience and the objective measures of restaurant performance reported here. However, informal observation suggests that experience in the role of a restaurant manager, not organizational experience or experience at a particular site, would be likely to assist a manager in many areas, including interacting effectively with customers, employees, and vendors in order to increase levels of service; tracking productivity in areas like meatcutting at target specifications of yield; carrying out administrative processes like inventory control and cash handling; and understanding the effects of problems in one subunit, such as the dining room, on the process capability of other subunits, such as the kitchen.

Data on the job of a restaurant manager indicate that the position offers managers an opportunity to exercise individual job knowledge and skill to affect sales and profits. Managers have some discretionary power. Indeed, the following moderate mean values for the variables assessed in the job indices suggest ideal conditions for observing a link between managerial job experience and performance: centralization ($\bar{x}$ = 2.09, s.d. = .78), authority ($\bar{x}$ = 3.47, s.d. = .82), formalization-routinization ($\bar{x}$ = 4.02, s.d. = .65), analyzability ($\bar{x}$ = 3.97, s.d. = .80). If, for example, the job was totally routine, no experience would be required. At the other extreme, experience would offer no advantage. This framework assumes that the relationship between experience and performance depends not only on the dimension of tenure and index of performance examined but also on the context in which those variables are assessed. Since all of the managers in this study carried out the same role in the same organization, the data cannot be used to test whether the link between length of job experience and performance varies with the nature of job demands. Future research should examine that possibility.

CONCLUSIONS

The present study is the first to demonstrate a positive relationship between the length of a manager's job experience and objective indices of performance. It thus provides a basis for additional research on the dynamics through which increasing experience results in greater sales and profits among managers in the establishment phase of their career. Given the potential effect of human-resource-utilization decisions regarding employee tenure on people and organizations, further systematic research to test propositions about the relationship between experience and performance would be valuable. Organizations are making decisions about the tenure of employees more frequently, often under more public scrutiny, than ever before (Bennett & Sease, 1986). From a practical perspective, the results of this study suggest that organizations should examine the relationship between managers' experience and their performance in formulating promotion, transfer, and retention policies. Unless a company specifically considers the performance consequences of job, position, and organizational tenure in developing human resource policies, it can seriously undermine its chances to survive against its competition, maximize its profits, or achieve the kind of growth it seeks.

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APPENDIX

Items for the job indices are listed below. Responses were measured on 5-point scales ranging from 1 = to a small extent to 5 = to a great extent. Items followed by R were reverse-scored. Solution of a factor analysis of the items supported the a priori scales with one exception—formalization and routinization loaded on the same factor. I therefore combined the two scales.

Routinization/Formalization. Would you say the work is routine? Are you expected to follow standard operating procedures? Is there an official record of the work you are expected to perform? Are the duties repetitious? Are there written rules and procedures that specify how you should do the job? Do you do about the same job in the same way most of the time? (α = .77.)

Analyzability. To what extent can you actually rely on established procedures and practices? Is there a clearly defined body of knowledge of subject matter which can guide you in doing the work? Is there a clearly known way to do the major types of work you normally encounter? (α = .76.)

Centralization. Do you have a great deal of say in decisions about how to do the work? (R) Are you involved in determining when to accomplish activities on the job? (R) To what extent do you participate in establishing performance targets for the job? (R) (α = .47.)

Authority. Are you authorized to solve problems not covered by rules and procedures without checking with a superior? Do you make job-related decisions without checking with or obtaining approval from a superior? To what extent do you check with someone with more authority when a problem arises? (α = .51.)

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OUTCOMES OF SEXUAL HARASSMENT CHARGES

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In recent years, an increasing amount of employment-related litigation has centered on sexual harassment. For example, the Equal Employment Opportunity Commission (EEOC) reported that the number of complaints filed rose from 4,272 in 1981 to 7,273 in 1985. Many other sexual harassment charges have been filed with EEOC-approved state and local intake agencies (*New York Times*, 1986). Other avenues of action for victims of sexual harassment might be based on the United States Constitution, traditional tort theories,[1] or collective bargaining contracts. However, Title VII of the Civil Rights Act of 1964 remains the most direct and specific remedy for victims of sexual harassment. Little information exists regarding the outcomes of Title VII charges. Additionally, there is a dearth of data as to the influence of specific case variables on those outcomes. Given the time, trouble, and risks associated with the filing of formal charges, such knowledge would be of obvious utility. It would aid potential complainants' decisions regarding

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[1] Tort theories include assault, battery, intentional infliction of emotional distress, slander, libel, invasion of privacy, and wrongful discharge.

whether or not to file formal charges. It might also help organizations decide whether to contest charges or settle out of court. The purpose of the current study was to archivally examine formal sexual harassment charges filed under Title VII in an attempt to (1) assess the relative frequency of the occurrence of two types of outcomes—settlement or dismissal—in sexual harassment cases and (2) investigate the influence of selected case variables on those outcomes. The case variables examined related to the nature of the sexual harassment reported, the evidential data produced, and prefiling actions.

LITERATURE REVIEW AND RESEARCH QUESTIONS

Nature of the Sexual Harassment Reported

Previous research (Gutek, Nakamura, Gahart, Handschumacher, & Russell, 1980; Merit Systems Protection Board, 1981; Powell, Benzinger, Bruno, Gibson, Pfeiffer, & Santopietro, 1981; Terpstra & Baker, in press) has indicated that individuals generally perceive behaviors such as sexual assault, unwanted physical contact of a sexual nature, and sexual propositions accompanied by threats or promises of a change in their job status to be clear-cut instances of sexual harassment. Conversely, there is less definitional consensus regarding behaviors such as sexual propositions unaccompanied by threats or promises of changes in job status, requests for dates or other socializing, offensive language or remarks, and unwanted nonverbal attention such as gestures, stares, and whistles. The initial complaints heard by the courts concerning sexual harassment dealt primarily with behaviors that were considered to be clear-cut instances. Less serious behaviors, such as making crude remarks or jokes, were not thought to be actionable under Title VII (Faley, 1982). Although the courts have since broadened their definition of sexual harassment to include behaviors of a less serious nature, it would still seem that charges involving behaviors of greater perceived seriousness would stand a greater chance of being resolved in favor of complainants. Our first research question addressed that possibility.

Legal reviews suggest that the courts and the EEOC typically consider the number of occasions of sexual harassment when making a factual determination of what conduct constitutes sexual harassment (Baxter, 1982; Linenberger, 1983). Although the number of occasions appears to influence case outcomes regardless of the seriousness of the behavior involved, this variable might be an even stronger influence in cases where the behavior does not directly affect a complainant's job status or conditions of employment. In such cases, some courts have taken the position that isolated or sporadic incidents are insufficient to prove that a Title VII violation has occurred. Rather, there must be enough sexual harassment to convince the trier of fact that a victim's working conditions have been adversely affected (Allegretti, 1983). Thus, we investigated whether charges involving sexual conduct of a repetitive nature would be more apt to be associated with favorable outcomes for complainants than charges involving an isolated incident.

The courts have generally imposed more liability on employers for the actions of supervisors than for similar behaviors on the part of co-workers. For example, the EEOC holds that an employer is generally liable for harassment by a supervisor regardless of whether or not the employer knew or should have known of the supervisor's behavior. On the other hand, the EEOC holds that employer liability for harassment perpetrated by co-workers is limited to cases in which an employer knew or should have known of the sexual harassment and failed to take investigative or remedial action (Allegretti, 1983; Baxter, 1982; Waks & Starr, 1982). Although the courts have not consistently adhered to the views of the EEOC, it does appear that they have been more reluctant to hold employers liable for co-worker harassment than for harassment by supervisors (Allegretti, 1983). Additionally, survey research (Collins & Blodgett, 1981; Merit Systems Protection Board, 1981) has indicated that employees perceive sexual overtures on the part of supervisors as more serious than similar behaviors on the part of co-workers, perhaps because any sexual overture from a supervisor toward a subordinate carries with it an implied or potential job threat. Thus, we investigated whether cases in which the harasser was the complainant's superior would be more likely to be disposed in favor of the complainant than cases in which the harasser was a co-worker.

Sexual harassment claims are clearly actionable under Title VII when a direct relationship between the sexual harassment behavior and tangible job-related consequences, such as discharge or demotion, can be demonstrated.[2] However, where the sexual harassment has no direct link to concrete job-related consequences and only indirectly affects conditions of employment by creating an intimidating, hostile, or offensive working environment, both the courts and the EEOC have been inconsistent in their opinions (Baxter, 1982; Faley, 1982; Linenberger, 1983). Thus, our study addressed the question of whether charges that involved tangible job-related consequences would be more apt to be resolved in favor of complainants than charges that did not involve such consequences.

Evidential Data

To the extent that complainants can support their charges with documentary evidence, we would expect the charges to be more apt to be believed and less apt to be dismissed as spurious or as attempts at retaliation for valid managerial decisions that adversely affected complainants. Thus, two research questions relating to evidential data were whether charges supported by witnesses and charges supported by documents would be more likely to be settled in favor of complainants.

As mentioned previously, sexual harassment behaviors that have a direct link with tangible job-related consequences are clearly in violation of Title

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[2] This is a discrimination theory labeled the tangible benefits theory by the courts (Faley, 1982).

VII (Baxter, 1982; Faley, 1982; Linenberger, 1983). Thus, the apparent legitimacy of the reason put forth by management for decisions that have adversely affected the complainant may be an important variable affecting the outcome of a sexual harassment case. In recent years, the question of motive has become increasingly important in employment law. Regarding discharge cases, for instance, few courts will question management's right to fire an employee for valid economic reasons, for documentable poor performance, or for violations of laws, company rules, or policies (Ewing, 1983). Conversely, reasons relating to attitude problems, personality conflicts, or "chemistry" might raise some suspicion as to the real motives involved in negative employment decisions. Thus, a third question relating to evidential data was whether cases involving negative employment-related consequences would be more apt to be resolved in favor of the complainants when the reasons set forth by management were rather ambiguous and unrelated to economic factors, poor performance, or violations of laws or company rules.

Prefiling Actions

The question of notice—whether or not an organization knew or should have known of the sexual harassment—has been a critical factor in many courts' decisions on employer liability for sexual harassment. Most courts have held that employers are not liable for sexual harassment on the part of an individual's co-workers when management has had no notice of the behavior. Additionally, some courts have refused to impose liability on organizations in cases involving sexual harassment by supervisors when management had no knowledge of such conduct (Allegretti, 1983; Baxter, 1982; Linenberger, 1983; Waks & Starr, 1982). Thus, we investigated whether cases in which complainants had not complained to superiors or management before filing formal charges would be less apt to be resolved in favor of the complainants.

The EEOC and the courts are in general agreement that employers are liable for sexual harassment by their employees when the employers knew of the behavior and failed to investigate or take action to resolve the problem (Allegretti, 1983; Baxter, 1982; Faley, 1982; Linenberger, 1983; Waks & Starr, 1982). Thus, we investigated whether cases in which organizations took no investigative or remedial action upon learning of alleged harassment would be more apt to be resolved in favor of the complainants.

METHODS

Source of Data

The data used in this study came from case reports of sexual harassment charges that were filed with the Illinois Department of Human Rights from July 1, 1981, through June 30, 1983. In the 81 cases filed during that period, 76 of the complainants were women and only 5 were men. The age of the complainants ranged from 18 to 50 years, with a mean of 30. With regard to marital status, 43 percent of the complainants were single, 31 percent were married, and 26 percent were divorced, widowed, or separated. The highest educational levels complainants had attained were as follows: less than a high school degree, 3 percent; high school degree, 41 percent; some college, 13 percent; college degree, 38 percent; graduate work, 5 percent. The percentages of complainants belonging to various occupational categories were: administrative and managerial, 11 percent; sales, 12 percent; professional, 3 percent; paraprofessional and technical, 18 percent; secretarial and clerical, 25 percent; skilled crafts, 5 percent; semiskilled and unskilled, 26 percent. Finally, the percentages of complainants in various salary ranges were: less than $10,000, 39 percent; $10,000–$14,999, 25 percent; $15,000–$19,999, 25 percent; $20,000 or more, 10 percent.

An analysis of the types of organizations involved revealed that most of the complaints were filed against firms in the private sector. The breakdown in terms of types of firms was: private sector–nonmanufacturing, 62 percent; private sector–manufacturing, 29 percent; city government, 5 percent; county government, 1 percent; state government, 1 percent; and union organization, 1 percent.[3]

Procedures

At the time a charge is filed with the Illinois Department of Human Rights it is also filed with the federal EEOC. We identified the charge sheets—forms that detail complainants' backgrounds, data on employers, the nature of the sexual harassment involved, evidential data, prefiling actions, and case outcomes—for the 81 cases and transferred the information on the charge sheets to a content analysis form developed by the first author. Before the actual coding, there was a practice session in which three coders—the first author and two graduate assistants—independently coded the data contained in five charge sheets and then met to discuss the degree of agreement among their classifications. The same three people coded the remaining 76 charge sheets at the Chicago office of the Department of Human Rights. Each coder coded a separate subset of the 76 cases; however, classification questions that arose during that phase were discussed by the three coders, who worked at adjoining desks, until a consensus was reached.

The director of the Department of Human Rights granted us access to the data under two conditions. The coding was to occur in the department's office so that the charge sheets would not leave that office, and the coders were to sign notarized statements that required them not to reveal the complainants' names or to contact them in the future.

Independent Variables

Nature of the sexual harassment. The types of behaviors recorded on the charge sheets and transferred to the content analysis forms were broken into two classes of perceived seriousness on the basis of previously cited literature (Faley, 1982; Gutek et al., 1980; Merit Systems Protection Board, 1981; Powell et al., 1981; Terpstra & Baker, in press). Behaviors checked on the charge sheets as either sexual assault, unwanted physical contact of a sexual nature, or sexual propositions linked to threats or promises of a change in an individual's conditions of employment constituted the class of high perceived seriousness, and behaviors checked as either sexual propositions unlinked to threats or promises of a change in the conditions of employment, requests for dates, offensive language or remarks, or unwanted nonverbal attention constituted the class of less serious behaviors. For analytical purposes we dummy coded high and low seriousness as 0 and 1, respectively. Information on whether the behavior occurred once (dummy coded as 0) or repeatedly (dummy coded as 1) and information on the status of the harasser (supervisor-superior = 1; co-worker = 0) was taken directly from checked data on the charge sheets. The job-related consequences checked on the charge sheets served as the basis for classifying charges as involving either tangible adverse job-related consequences—such as discharge, demotion, denial of promotion, a poor evaluation, or unfair wages—or offensive working conditions (dummy coded as 1 and 0, respectively).

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[3] We conducted analyses to examine the relationship between a case's outcome and its date of filing, the complainant's gender, age, education, occupation, and salary, and type of organization. Neither individual chi-square analyses nor a logistic regression equation containing all of the above variables revealed any significant relationships.

Evidential data. Information on the presence or absence of witnesses and on the presence or absence of documents was obtained directly from checked items on the charge sheets. Presence was dummy coded as 1 and absence as 0. Management's stated reasons for decisions having an adverse effect on a complainant's conditions of employment were classified as either business-related or non-business-related (Ewing, 1983). We classified reasons involving economic motives, poor performance, or violation of laws or company rules or policies as business-related (dummy coded as 1). Non-business-related reasons included those recorded as involving attitude problems, personality conflicts, or "chemistry" (dummy coded as 0).

Prefiling actions. Information relating to the question of notice, or whether a complainant complained to superiors or management before filing charges, came directly from checked items on the charge sheets. Information on whether an organization took investigative or remedial action on being notified of alleged sexual harassment was also so collected. Positive action on either variable was dummy coded as 1 and no action as 0.

Dependent Variable

The complaints were subject to two basic outcomes. A *favorable outcome* for a complainant was an independent settlement or a formal settlement by the Department of Human Rights involving a monetary award, a positive change in employment conditions, or both. An unfavorable outcome for a complainant was either (1) an independent settlement or a formal settlement by the department involving only cleared personnel files or the granting of neutral references, or (2) dismissal of the complaint for reasons such as lack of substantial evidence, failure to follow through, or withdrawal of the complaint. A favorable outcome was dummy coded as 1 and an unfavorable outcome as 0.

The dichotomous categorization scheme retains the most important practical distinction from the standpoint of a complainant—the filing of a formal complaint either results in a favorable outcome, or it does not. Previous research dealing with the analysis of employee grievances has similarly combined categories such as grievance loss, grievance withdrawal, or grievance abandonment into one unfavorable outcome category (Dalton & Todor, 1981, 1982a, 1982b, 1985; Dalton, Todor, & Owen, 1987).

RESULTS

Outcomes

The 81 complaints were examined to assess the relative frequency of occurrence of the types of outcomes. After excluding 11 cases that required further investigation and 5 additional cases that the Department of Human Rights was not authorized to process due to a lack of jurisdiction, we found that only 31 percent (20 of 65) of the formal charges resulted in a favorable settlement for the complainant. Of those favorable settlements, 17 of the 20 cases involved monetary awards, and the remaining 3 settlements involved the granting of an individual's previous position back after a demotion, a promotion that had previously been denied, and participation in an organizational training program. The cash settlements ranged from $100 to $15,000, with the mean being $3,234.

Influence of Case Variables upon Outcomes

A logistic regression analysis was employed to investigate the relationship between the outcomes of charges and the nine variables related to the nature of the sexual harassment, evidential data, and prefiling actions. Table 1 presents the results of the logistic regression analysis. Three of the nine independent variables—the type of harassment behavior, the presence or absence of witnesses, and notice to management—were significantly related to the charge outcomes. As to the type of behavior, the results indicated that charges involving behaviors of high perceived seriousness, such as sexual assault, unwanted physical contact, and propositions linked to threats or promises of a change in an individual's conditions of employment, were more likely to be resolved favorably for the complainant than were charges involving less serious behaviors, such as unlinked propositions, date requests, offensive language or remarks, and unwanted nonverbal attention.

The analysis indicated that the likelihood of a favorable settlement for a complainant was much higher if the complainant had witnesses. Notice to management was also significant; complainants who had notified their superiors or management of the alleged harassment before filing charges were more likely to receive favorable settlements than those who had not done so.

TABLE 1
Results of Logistic Regression of Charge Outcome on Case Variables[a]

Variables	Coefficients[b]	Standard Errors
Type of behavior	−3.44**	1.53
Number of occasions	−1.27	1.47
Status of harasser	0.91	1.24
Consequences	0.80	1.56
Witnesses	11.36**	4.59
Documents	−1.75	1.35
Management reason	−0.31	1.13
Notice	2.25*	1.18
Organizational action	3.07	1.96

[a] Listwise deletion reduced the N for the model to 46.

[b] The coefficients can be interpreted such that a one-unit change in the independent variable results in a one-unit change in the log likelihood of a favorable outcome. The log likelihood ratio for the overall equation $(-2 \ln \lambda) = 22.08$, $df = 9$, $p < .01$.

* $p < .05$, two-tailed test.

** $p < .01$, two-tailed test.

Case Strength and Outcomes

The three significant variables that emerged were used to assess the relationship between the total strength of a case and the outcome of the charges. We calculated the strength of a case by summing the codes for type of behavior (1 = more serious, 0 = less serious), witnesses (1 = presence, 0 = absence), and notice (1 = notice given, 0 = notice not given). Thus, case strength was simply a measure of the number of significant factors the complainants had in their favor. A logistic regression analysis yielded a significant, positive relationship between case strength and outcome ($b = 1.03$, $\chi^2[53] = 60.45$, $p < .05$), indicating that no one variable determined the outcome. The more factors the complainants had in their favor, the greater were their chances of a favorable outcome.

DISCUSSION

The current study attempted to furnish information relating to the outcomes of formal sexual harassment complaints and to gauge the influence of selected case variables on those outcomes. Although the population of cases was relatively small and confined to a specific geographic region, empirical data in this area is scant and difficult to obtain. Thus, the current findings may be useful.

As the findings show that only 31 percent of the charges filed in this study resulted in favorable outcomes for the complainants, individuals considering filing formal sexual harassment complaints under Title VII should carefully consider the strengths and weaknesses of their cases. The results indicate that complainants' chances of a favorable outcome are enhanced if the sexual harassment behavior involved sexual assault, unwanted physical contact of a sexual nature, or sexual propositions linked to threats or promises of a change in the conditions of employment. Additionally, complainants' chances are better if they have witnesses to support their charges and if they have notified management of the problem before filing charges. The more of those three factors complainants have in their favor, the better their chances are for a favorable outcome.

From an employer's perspective, the current findings suggest the wisdom of developing formal sexual harassment policies that clearly specify the types of behaviors perceived as sexual harassment. Those policies should be communicated, along with the potential penalties for engaging in sexual harassment. Such action should lessen the occurrence of the more serious types of harassment and decrease potential settlement costs for organizations. The retention of valued employees is an additional factor arguing for the adoption of these recommendations.

The findings regarding notice suggest that organizations should also establish in-house grievance and complaint procedures to be followed in the event of sexual harassment. If such procedures exist and a complainant fails to use them, an organization increases its odds of a settlement in its favor. Established grievance and complaint systems should also allow for the resolution of sexual harassment problems before they reach the filing stage.

The current findings might also aid organizations in deciding whether to contest sexual harassment charges or settle out of court. For instance, if a complainant has been the victim of a serious type of harassment, has witnesses, and has notified management of the problem, it may be less expensive to settle the charge out of court. In such a situation the complainant has a good chance of winning.

More research with similar samples is needed to assess the representativeness of the current findings. It might also be of interest to gather comparative data on the outcomes and costs associated with sexual harassment remedies other than Title VII. In conclusion, the current study has taken a step toward the construction of an informational base that should help both individuals and organizations cope with the problem of sexual harassment.

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THE IMPACT OF ANNOUNCEMENTS OF CORPORATE ILLEGALITIES ON SHAREHOLDER RETURNS

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In spite of considerable research addressing the relationship between corporate social responsibility and financial performance, findings to date have been inconclusive.

Reviews of those contradictory findings (Arlow & Gannon, 1982; Cochran & Wood, 1984; Ullmann, 1985) have suggested three major methodological explanations for the lack of consensus on the issue: (1) the use of questionable indexes of social responsibility, (2) poor measures of financial performance, and (3) inadequate statistical procedures.

The present study addressed the three enumerated concerns head-on. First, instead of using perceptual or largely subjective ratings of corporate social responsibility, we used actual announcements of corporate illegalities as proxies for social irresponsibility. Second, rather than using some variation of the typically employed accounting-determined profitability measures, which are inadequate when making large cross-sectional comparisons across industries and across time (Davidson, Worrell, & Gilbertson, 1986; Merchant & Burns, 1986), we assessed financial performance by means of shareholder returns. Finally, following Cochran and Wood's suggestion (1984: 46), we employed event methodology which is new to the study of corporate social responsibility and financial performance.

If the market operates efficiently and penalizes irresponsible acts, this study will provide evidence that it is able in part to police itself along the lines suggested by Fama (1980). Managers and investors alike would pay a price for corporate illegalities.

FIRM VALUE AND SOCIAL RESPONSIBILITY

Should a corporation, caught in an illegal act, expect its stock price to react? The answer can best be framed in terms of firm valuation theory. The theoretical value of any firm is the present value of its expected cash flows discounted at a risk-adjusted rate of return. To increase the value of stock, either the expected dividends must increase, the risk-adjusted discount rate of the firm must decrease, or both must occur.

This study attempted to determine the stock market's reaction to a public announcement that a corporation has been caught allegedly committing a crime. The actual commission of a crime may or may not influence stock prices; we did not focus on crime but on getting caught. For example, some companies may commit crimes that improve cash flows, such as tax evasion and bribing elected officials, and may thereby increase firm value if they are not caught. If they are caught, firm value may decline because investors expect the firm to incur fines and penalties or to lose sales revenues if socially conscious buyers switch to another firm. Thus, clear distinctions must be drawn between committing a crime and getting caught and between their separate effects on earnings and firm value.

Event methodology is an appropriate way to determine the valuation effects of socially irresponsible and responsible actions because it can find very short-term, even single-day, reactions. Accounting-based returns, on the other hand, may not reflect a reaction until the next accounting report is prepared. By then, a company may have been involved in so many things that the impact of the act in question may not be discernible.

METHODS

Study Population

Fortune (Ross, 1980) canvassed 1,043 firms that had appeared since 1970 on its lists of the 800 largest industrial and nonindustrial corporations and found that 11 percent (117 firms) of those major American corporations had been involved in at least one corrupt practice that resulted either in a conviction on federal criminal charges or in consent decrees. The *Fortune* survey excluded crimes committed far down the chain of command and limited itself to domestic cases. Only five specific "blatant illegalities" were examined: bribery, including kickbacks and illegal rebates; criminal fraud; tax evasion; illegal political contributions; and criminal antitrust violations, limited to price-fixing and bid-rigging. The current study's data set was drawn from this compilation.

For a firm to be included in the study, its stock had to be listed on either the New York or American stock exchange. That criterion served two purposes. First, it ensured that the stock was traded frequently enough that market model parameters could be estimated. Second, it allowed the use of the University of Chicago's Center for Research in Security Prices tapes.

In each case, the original *Wall Street Journal* story on the accusation was examined and the date of publication was obtained. We employed the date of announcement in the *Wall Street Journal* as the event date.

The selection criteria were met by 96 companies. Several of them had been involved in more than one accusation. We located a total of 131 events, or accusations. They included 66 cases of price fixing, 16 cases of illegal campaign contributions, 15 cases of illegal funds being kept with poor accounting practices, 9 cases of bribery, 4 cases of tax evasion, and 3 cases of defrauding customers. The remaining 18 accusations concerned miscellaneous illegalities.

Data Analysis

The purpose of this study was to determine the stock market's reaction to the *Wall Street Journal*'s announcements of alleged corporate crime. We used the standard event methodology. A complete explanation of that methodology appears in the Appendix to a previous study (Worrell, Davidson, Chandy, & Garrison, 1986).

The market model was used to predict normal returns. A market model is formed by regressing the daily returns on each security against a market index. We thus computed normal returns for each firm for a period ranging from 90 days before through 90 days after an announcement. We then compared actual returns with the normal returns to obtain the differences called abnormal returns, summed and averaged the abnormal returns across companies for each of the 181 days, and cumulated them over various intervals. Those computations provided the average abnormal returns and the cumulative abnormal returns. If investors have received information that causes stock prices to rise relative to the market, the average abnormal returns and cumulative abnormal returns will be positive. If the information causes stock prices to decline relative to the market, then those statistics will be negative. We conducted t-tests on the statistics to determine their levels of significance.

RESULTS

Table 1 shows the results for various intervals of the cumulative abnormal return (*CAR*). For the overall interval, –90 to +90, the change is positive but statistically insignificant at conventional statistical thresholds. The values for the all multiday intervals except the interval between the tenth and the first days before an event are similarly positive but insignificant.

The *CAR* over the interval –10 to –1 is negative but insignificant. From the results for the single days during that period, it can be seen that the value of *CAR* for the day before the event (day –1) is a negative .0087, nearly a negative 1 percent. This single-day *CAR*, which is statistically significant at the .001 level, occurs for the date that stories were released. A compounded daily return of this size would turn a one dollar investment into $23.61 in one year. Wire services generally carry stories one day before their publication in a newspaper like the *Wall Street Journal*. Therefore, the reaction on day –1 is not unusual nor unexpected. There is no statistically significant market reaction on the actual announcement date, day 0.

DISCUSSION

This study incorporated an objective measure of corporate social responsibility, announcements of corporate illegalities, and event methodology, a statistical tool that is new to research on corporate social responsibility. It linked corporate social irresponsibility with investors' returns rather than with accounting returns.

Investors' returns are superior to accounting-based performance measures because they are not marred by accounting problems (Davidson et al.,

TABLE 1
Cumulative Abnormal Returns Surrounding Announcements of Corporate Illegalities

	Market Model		Average-Return Model[a]	
Intervals	*CAR*	*t*	*CAR*	*t*
−90 to 90	.0501	1.48	.0683	1.88
−90 to −1	.0222	0.94	.0484	1.89
−60 to −1	.0084	0.43	.0244	1.65
−30 to −1	.0104	0.76	.0173	1.17
−10 to −1	−.0079	−1.00	−.0067	−0.77
−5	.0028	1.12	.0030	1.11
−4	−.0003	−0.12	−.0006	−0.22
−3	−.0027	−1.08	−.0030	−1.11
−2	.0018	0.72	.0020	0.74
−1	−.0087	−3.48***	−.0080	−2.96**
0	−.0021	−0.84	−.0005	−0.19
1	−.0003	−0.12	.0006	0.22
2	.0024	0.96	.0028	1.04
3	−.0002	−0.08	.0004	0.15
4	−.0029	−1.16	−.0033	−1.22
5	.0013	0.52	.0017	0.63
0 to 10	.0098	1.18	.0131	1.52
0 to 30	.0006	0.04	.0102	0.69
0 to 60	.0045	0.23	.0249	1.68
0 to 90	.0278	1.16	.0199	0.77

[a] The average-return model has been included to confirm the results obtained with the market model. In the average-return model, the assumption that the intercept is 0 and the slope is 1 replaces computing the original regression equation. Results for the average-return model are qualitatively the same as those for the market model.

** $p < .01$

*** $p < .001$

1986; Merchant & Burns, 1986). Another flaw of accounting returns is that social irresponsibility—if it influences accounting returns at all—may not affect them until a year ends. The delay makes it hard to associate financial performance with the irresponsible corporate act. Investors' returns, on the other hand, can be monitored daily to determine the immediacy of an effect.

The results shown here indicate that timing is not trivial. The market does react negatively to the release of news of corporate illegality, but the reaction is a one-time downward adjustment of stock returns on the day the news first reaches the market. If an investigator examined overall financial performance for the year of such an announcement, using either accounting or investor returns, the market's reaction to the announcement may be lost, just as the day −1 reaction is lost in examining the results over the total interval −90 to 90. Event methodology using daily returns can isolate even single-day reactions to information.

The day −1 reaction is consistent with the concept of market efficiency (Fama, 1976). Through news media and wire services, securities analysts may obtain information on corporate wrongdoing and adjust their recommendations and portfolios before a *Wall Street Journal* announcement.

If the stock market operates efficiently, market forces should somewhat constrain errant management behavior. If, for example, managers choose to make decisions that are unpopular with shareholders—decisions that reduce stockholders' wealth—stock prices will fall. Managers' profit shares will be likely to diminish, and the threat of hostile takeovers, proxy fights, and managerial firings may increase. Fama (1980) referred to the process as ex post settling-up.

If the market does not operate efficiently, government regulation may be necessary to prevent undesired corporate behavior. However, our results indicate that the market does, at least in the very short term, penalize the stock prices of firms that are caught in socially irresponsible acts.

Those results are consistent with the hypothesis that the market will react negatively to announcements of social irresponsibility—in this case, criminal acts. Since each criminal act and its probable penalties are minor relative to the size of a large company, we cannot be sure that anticipation of eventual penalties accounts for the market's reaction. Instead, the results suggest that there is a negative reaction to public announcements of social irresponsibility.

However, committing a crime or even getting caught may still not have a negative effect on firm value. Some crimes may be intrinsically bad and may harm society in general; polluting is an example. Other crimes may be designated as such because the government has been pressured to so label them; antitrust violations are an example. The stock market may be sensitive to type of illegality. Future research should address this problem.

Future research should also attempt to take into account the beneficial effects of illegal acts. Ethical issues aside, from a shareholder's standpoint, illegal acts may be worthwhile if their expected benefits outweigh their expected costs.

In addition, some investors may view managerial attempts to test the legal waters as preferable to always proceeding in a risk-averse manner. Wealth-maximizing shareholders may consider it desirable for managers to occasionally get caught trying to cheat.

As with any investigation of this type, the current research was limited by the methodology employed (event methodology), the type of event examined (announcements of specific corporate wrongdoings), the sample of firms chosen (96 companies from *Fortune*'s list of large firms engaged in blatant illegalities in the 1970s), and the timeframe over which results were measured (181 days). However, this study represents a step away from the research designs of past studies of corporate social responsibility, which typically examined relationships between subjective indices of social responsibility and inappropriate accounting measures of financial performance.

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EFFECTS OF TOP MANAGERS' CABINET APPOINTMENTS ON SHAREHOLDERS' WEALTH

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It has been a tradition in the United States that senior-level corporate officials come from the private sector to provide managerial leadership and intellectual guidance to the federal government. Mills (1956), Baran and Sweezy (1966), Lindblom (1977), Freitag (1975), and Hessen (1981) even postulated the existence of a "power elite" (Mills, 1956) that dominates and connects the upper echelons of government and business. Freitag, for example, found that over 75 percent of cabinet members had held positions of power in large, private business enterprises. The movement of senior-level business executives into government service may, however, do more than just provide the government with skilled individuals. Cabinet members and other high-level public officials may also have substantial influence on government policy that directly or indirectly affects the future value of their firms.[1]

This study focused on how the appointment to a cabinet post of a top executive from a firm affects the firm's stock value. Researchers have commonly assumed that change in the top management of an organization affects its performance (Mintzburg, 1973; Weiner, 1978). Previous studies have, however, reported conflicting results for management changes within the private sector involving no loss to government service. Reinganum (1985) found a positive association between changes in chief executive officer (CEO) and president and a firm's abnormal stock return in cases in which an outsider is appointed, the firm is small, and the previous officeholder leaves the firm. Warner, Watts, and Wruck (1985) failed to find abnormal stock performance either preceding or coincident with the announcement of top corporate management changes. Johnson, Magee, Nagarajan, and Newman (1985) reported a negative association between certain types of management changes, such as those caused by unexpected death, and abnormal stock returns.

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[1] Restrictions exist on the extent to which executives entering or leaving government service can directly promote corporate affiliations. For instance, officials leaving government service are restricted for a period of time from acting on behalf of firms in cases in which they made contract or funding decisions. Such restrictions, however, have often been circumvented, and they do not prevent informal actions which may favor particular groups.

Those studies have, however, only examined management changes within the private sector. No one has investigated the effect on stock value of top corporate managers' receiving cabinet appointments. Various predictions may be made about such a stock-price reaction. A cabinet appointment from among a firm's top executives may be detrimental to stock market returns because, as a sudden management change, it would be more likely to be disruptive than an expected change that allows for a smooth transition between chief executives would be (Johnson et al., 1985; McGuire & Schneeweis, 1985).

However, the latitude cabinet officials have in administering their offices and interpreting legal mandates may enable them to promote governmental actions beneficial to a firm. For instance, as informal advisors to the president and associates of Congress, cabinet members are in a position to represent their former firms before both the president and the legislature. Thus, a cabinet appointment from among a firm's executives may lead investors to perceive an increase in future firm earnings and may therefore raise the value of the firm's stock. This argument rests on investors' expectations of a beneficial effect. Such expectations need not be based on anticipation of an official's direct action. Rather, investors may anticipate policies favorable to an industry.

Finally, a government appointment may have little effect on a firm's market value. Several researchers (Mintzburg, 1973; Salancik & Pfeffer, 1977; Warwick, 1979) have argued that individuals have little power to change a large and complex bureaucracy, whose members may have interests different from those of their superiors. New cabinet officials may have little control over departmental actions. The size and the bureaucratic nature of an executive department of the government may prevent cabinet officials from instituting changes beneficial to their former firms.[2]

Using a standard event-day methodology, we analyzed abnormal market returns for firms that lost a senior executive to a cabinet appointment and firms that experienced unexpected or expected management change with no such appointment involved.

METHODS

Sources of Data

Two broad groups of firms were studied: (1) firms whose president or CEO simply changed and (2) firms whose president, CEO, or senior vice president became a cabinet secretary or an assistant secretary. The periods analyzed were 1971–82 for firms experiencing management changes involving the private sector only and 1964–84 for firms whose top executives accepted cabinet appointments. We used a longer period for the second group to eliminate possible bias from the examination of events in solely Republican or Democratic presidential administrations (Riley & Laksetich, 1980).[3] Since abnormal stock-market performance analysis controls for general market trends, the use of differing time frames should not affect results. We included several firms in which senior vice presidents were the cabinet appointees to make the sizes of the two groups more similar. Borstadt (1985) found that the effects of management change on abnormal stock returns declines with hierarchical position; thus, including lower-level corporate executives provided a more conservative test of the effects of cabinet appointments.

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[2] Reinganum (1985) suggested that management succession has little significant effect on stockholders' returns in large firms. Reinganum's results are consistent with the view that leadership influence is constrained in larger organizations. Cabinet appointees are likely to be from large firms, so their departure may have little impact on investors' perceptions of the value of the firm.

Firms experiencing private-sector management changes were classified into two subsets: those in which change was expected, the result of an anticipated retirement, a long illness, or a known intention to resign, and those in which change was unexpected, the result of death, a sudden illness, or an unexpected resignation or dismissal. Two coders, working independently, classified the successions. They disagreed on only one case, and further research resolved the coding of that case. Only firms whose stock is traded on the New York or American stock exchanges were included. Firms on which data regarding the date and reason for a change were absent and those for which management change was the result of merger, acquisition, the formation of a new subsidiary, or another major change were excluded because such causes of management succession could affect measurement of its effects.[4] Of a final set of 70 management changes, 23 were expected, 25 were unexpected, and 22 were the result of cabinet appointments.[5]

Since previous studies (Reinganum, 1985) have suggested that organizational context moderates the effects of management change on a firm's performance, we also compared the firms in the three subsets in terms of size, industry, and outside/inside succession. The firms represented 34 industries in either the service or the manufacturing sector. For all management changes, inside succession dominated. An outsider replaced an executive in only three cases, which were in the expected-change subset. The low incidence of outside succession is consistent with the findings of previous researchers (James & Soref, 1981; Lubatkin, Chang, Rogers, & Owers, 1986; Reinganum, 1985). Large firms dominated in all three subsets. The average size of the firms in this study was equal to or slightly larger than those used in other studies (Reinganum, 1985; Weiner & Mahoney, 1981). There were no significant differences in size, industry type, or type of succession among the three subsets.

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[3] The results of Riley and Laksetich (1980) indicated that the market may increase more after a Republican election win.

[4] Tests that do not adjust for such events are really joint tests of an event and a management change.

[5] A previous study (McGuire & Schneeweis, 1985) contains a full description of the subset of firms experiencing private sector changes. Details of the subset experiencing changes due to cabinet appointments are available from the authors.

Performance Measurement

This study used abnormal stock returns to assess the effects of the three types of changes in top-level management. Abnormal, or unexpected, stock return is the difference between an observed return and an expected return. Studies of management succession (Reinganum, 1985), mergers (Lubatkin et al., 1986), and strategic planning systems (Kudla, 1981) have used abnormal returns to study the effects of unexpected information on the market value of firms. Stock market returns have several advantages over traditional, accounting-based measures of firm performance. (1) They are less susceptible to managerial control and manipulation (Briloff, 1972). (2) Market returns reflect investors' evaluation of a firm's future ability to generate earnings, but accounting-based measures reflect past performance (McGuire, Schneeweis, & Branch, 1987). (3) Since market returns reflect unexpected information immediately, the effects of confounding variables are reduced (McGuire et al., 1987).[6]

Recent research evaluating the effects of management change on firm value has used capital market event-study methodology (Reinganum, 1985). In that methodology, the normal return, or the return to a firm's stock expected in the absence of an event, is first estimated. The abnormal return is then measured before and after the event to assess the event's impact on firm value.

The methodology used in this study followed that used in previous studies of management change (Borstadt, 1986; Johnson et al., 1985; Reinganum, 1985; Warner et al., 1985). The event date used was the date news of a cabinet appointment or a management change was published in the financial press.[7]

In this study, we derived abnormal stock returns as:

$$A_{i,t} = R_{i,t} - R_{m,t} ,$$

where $R_{i,t}$ is the return on security i at time t, and $R_{m,t}$ is the return on the *Standard and Poor's* 500 index at time t.[8]

Our tests followed the approach of Brown and Warner (1985). For each firm, we first divided the abnormal return, $A_{i,t}$, by its own estimated standard deviation to obtain a standardized abnormal residual, $SAR_{i,t}$. To avoid any confounding effect on return variance that an announcement of management change might have, the standard deviations used were derived from data that did not come from the test period and thus were unaffected by the events.[9]

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[6] Market return is increasingly being used in management studies as a measure of firm performance (Neumann, 1980; Reinganum, 1985; Lubatkin et al., 1986). Lubatkin and Shrieves (1986) discussed the theoretical advantages of stock market return as a performance measure.

[7] We used the *New York Times*, the *Wall Street Journal*, and *Disclosure Journal* as sources of reports of executive changes since the financial community follows them and they are therefore widely accepted sources of information for event studies.

[8] Brown and Warner (1985) showed that both market adjustment and market model adjustment are equally powerful in examining the impact of events and announcements on security prices. An analysis using market model adjustment, available from the authors, showed results that were nearly identical to those presented here.

The test statistic for subgroup j for day t is:

$$SAR_{j,t} = \frac{\sum_{i=1}^{N} SAR_{i,t}}{\sqrt{N}} ,$$

where N is the number of stocks.

In the absence of abnormal performance, $SAR_{j,t}$ will be normally distributed, with a mean of 0 and a standard deviation of 1.

In addition to analyzing the effects of succession and cabinet appointments on abnormal stock returns on the days of announcement, we analyzed the cumulative effects of the three types of management change on firms' abnormal stock returns over a period of time surrounding the event dates. We obtained the cumulative standardized abnormal returns (CSAR) by aggregating daily standardized abnormal returns over a period beginning 30 days before the publication data and ending 30 days after it:

$$CSAR_{j,t} = \sum_{t=-30}^{t=+30} SAR_{j,t} ,$$

where $t = 0$ on the day of the press announcement, and $SAR_{j,t}$ = the standardized abnormal return on day t for population j.

To the degree that no confounding effects take place, the cumulative abnormal return will capture, over a selected time interval, the total impact of a management change on investors' perceptions of a firm's value. Although on any one day, $SAR_{j,t}$ may be significantly different from 0, over a longer period, random effects should balance out so that $CSAR_{j,t}$ will not increase significantly from 0.

In order to assess the trend in the cumulative standardized abnormal return over the test period, we examined the increase in CSAR over consecutive weekly intervals. The test statistic for any five-day period is:

$$\sum_{t=1}^{5} CSAR_{j,t} \times \sqrt{5} ,$$

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[9] The period ranging from the 90th through the 60th day before the event is used to obtain the firm's standard deviation. For further discussion of this methodology, see Dyckman, Philbrick, and Stephan (1984) and Collins and Dent (1984).

where t = the first day of any consecutive five-day period in a period of analysis ($t = -30$ to $t = +25$). Since the expected SAR on any day t has a mean of 0 and a standard deviation of 1, in the absence of abnormal performance the increase in $CSAR_{j,t}$ for any five days will be distributed with a mean of 0 and a standard deviation equal to the square root 5.[10]

RESULTS

In Table 1 we present the standardized abnormal returns (*SARs*) and cumulative standardized abnormal returns (*CSARs*) for the three types of management changes: (1) cabinet appointments, (2) expected private sector, and (3) unexpected private sector. Figure 1 is a graph of the cumulative standardized abnormal returns.

For the subset in which top executives received cabinet appointments, *SAR* is negative on the date of publication (day 0) but is not significantly different from 0. The lack of statistical significance is consistent with the theoretical argument that a management change in a large organization has little impact on a firm's value (Reinganum, 1985). Similarly, within a large government bureaucracy, cabinet officials may have little influence on decisions affecting their previous firms' stock value. For the subset in which management change was expected, *SAR* is also not significantly different from 0 on the day of publication, perhaps in part because investors had previously adjusted the stock price to compensate for the expected announcement of a management change. In a stock market that is informationally efficient, the value of a stock will not change when a management change is reported but when investors become aware of the expected change. In contrast, for unexpected management changes, the data shows significant negative effects on the day before publication (day −1) but no effects on the day of publication. The impact on day −1 may result from market knowledge of an event before its publication date, which is usually the day after an event.

Thus, results are similar both for expected management changes within the private sector and for management changes due to cabinet appointments. In both instances, on the day of publication there is no significant effect on abnormal returns. Cabinet appointments may lack significant impact because investors have fully anticipated the management change. Alternatively, the possible disruptive effects of a top executive's leaving a firm unexpectedly may be balanced out by investors' perceptions that, as a cabinet member, that individual will be able to promote actions beneficial to the firm.

Positive effects for management changes resulting from cabinet appointments can be seen in stock values for the period after publication dates. For

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[10] The use of this statistical analysis is based on the assumptions that (1) daily abnormal returns are independent and (2) the out-of-period variance is an adequate forecast of within-period variance. Since the variance of *SAR* is assumed to be 1, the weekly variance, five times the daily variance, is assumed to be 5. The five-day standard deviation is thus assumed to be the square root of 5, or 2.25. Thus, any five-day interval with an increase of + or − 4.5 (2 s.d.) may be said to contain a cumulative standardized abnormal return significantly different from 0. For other time periods, the proper test statistic would be 2 s.d., or twice the square root of the number of days.

TABLE 1
Standardized Abnormal Returns and Cumulative Standardized Abnormal Returns for the Three Subsets[a]

	Changes from Cabinet Appointments		Expected Private-Sector Changes		Unexpected Private-Sector Changes	
Day	*SAR*	*CSAR*	*SAR*	*CSAR*	*SAR*	*CSAR*
−30	0.207	0.207	1.156	1.156	0.542	0.542
−29	0.173	0.380	−0.110	1.045	0.642	1.184
−28	−1.102	−0.722	1.890	2.935	0.504	1.688
−27	0.373	−0.349	−0.806	2.129	0.408	2.096
−26	1.522	1.173	0.484	2.614	−0.570	1.526
−25	−0.818	0.355	1.026	3.640	−0.278	1.248
−24	−1.623	−1.269	1.079	4.719	−0.854	0.394
−23	−0.921	−2.190	−1.113	3.606	0.282	0.676
−22	0.445	−1.745	0.839	4.446	0.736	1.412
−21	0.007	−1.738	−0.355	4.091	−0.218	1.194
−20	0.000	−1.738	−1.367	2.724	0.546	1.740
−19	−0.304	−2.042	−1.026	1.698	1.296	3.036
−18	0.694	−1.347	−0.034	1.664	2.686	5.722
−17	1.117	−0.231	−0.590	1.074	1.260	6.982
−16	1.308	1.077	0.005	1.079	−0.866	6.116
−15	0.073	1.150	1.741	2.820	1.256	7.372
−14	0.187	1.337	−0.700	2.120	0.236	7.608
−13	−3.050	−1.713	1.213	3.333	3.028	10.636
−12	0.887	−0.826	−1.093	2.240	−1.292	9.344
−11	1.167	0.341	−0.317	1.923	0.672	10.016
−10	−0.460	−0.119	−1.252	0.671	−0.456	9.560
−9	1.170	1.051	−0.158	0.513	−1.116	8.444
−8	1.090	2.141	−0.163	0.350	0.644	9.088
−7	0.019	2.160	1.463	1.813	1.048	10.136
−6	0.976	3.137	0.269	2.081	0.074	10.210
−5	0.682	3.818	0.470	2.551	−0.640	9.570
−4	−0.357	3.461	0.110	2.662	0.462	10.032
−3	−0.393	3.068	−0.815	1.846	−2.448	7.584
−2	0.093	3.161	0.062	1.909	0.878	8.462
−1	0.854	4.013	−1.161	0.748	−2.826	5.636
0	−1.077	2.938	0.954	1.703	−0.218	5.418
1	0.189	3.127	−0.590	1.113	−0.568	4.850
2	2.508	5.635	0.599	1.712	1.312	6.162
3	0.419	6.053	−0.369	1.343	−0.428	5.734
4	1.663	7.717	−0.595	0.748	0.542	6.276
5	1.243	8.959	2.043	2.791	−0.308	5.968
6	−0.615	8.345	0.590	3.381	−0.618	5.350
7	0.007	8.357	1.468	4.849	0.102	5.452
8	1.942	10.293	0.139	4.988	0.002	5.454
9	0.831	11.125	−0.317	4.671	0.946	6.400
10	1.183	12.307	−1.084	3.587	0.456	6.856
11	−0.196	12.111	−1.108	2.479	−1.460	5.396
12	1.617	13.728	1.626	4.105	−0.054	5.342
13	−1.478	12.250	0.341	4.446	−0.596	4.746
14	1.398	13.647	−1.424	3.021	−1.908	2.838
15	−0.156	13.491	0.331	3.352	1.188	4.026

TABLE 1 (continued)

	Changes from Cabinet Appointments		Expected Private-Sector Changes		Unexpected Private-Sector Changes	
Day	***SAR***	***CSAR***	***SAR***	***CSAR***	***SAR***	***CSAR***
16	−0.767	12.725	0.652	4.005	1.682	5.708
17	0.573	13.298	0.115	4.120	0.658	6.366
18	−0.457	12.841	0.422	4.542	1.642	8.008
19	1.561	14.402	1.185	5.726	−0.280	7.728
20	0.343	14.745	0.058	5.784	−0.056	7.672
21	−0.351	14.394	−0.906	4.877	−1.364	6.308
22	1.605	15.999	−0.806	4.072	−1.890	4.418
23	0.370	16.368	−0.062	4.009	1.962	6.380
24	1.108	17.977	−0.782	3.228	−1.996	4.384
25	−0.710	17.267	−1.247	1.981	0.202	4.586
26	−0.328	16.939	0.077	2.057	0.446	5.032
27	0.065	17.004	−0.715	1.343	−0.824	4.208
28	−0.455	16.550	2.005	3.347	−1.006	3.202
29	0.534	17.084	0.273	3.621	0.914	4.116
30	1.684	18.768	−1.664	1.957	0.092	4.208

[a] A standardized residual > 1.71 or < −1.71 is significantly different from 0 ($p < .10$, two-tailed test).

the five trading days after the press announcements, the values for *CSAR* for the firms experiencing such a change show significant, positive change.[11] At the publication date, *CSAR* was relatively small (2.938). One week later, on day 5, *CSAR* had grown to 8.959. This change in the value of *CSAR* is significantly different from 0 ($p < .10$). Thus, firms whose management change resulted from a cabinet appointment experienced a significant, positive abnormal return for the week following the change.

The significant, positive growth in *CSAR* for the five trading days following an announcement suggests that investors react slowly to possibility of beneficial effects from top executive's entering government service. Another possible reason for the delayed positive market reaction is that publicity resulting from cabinet appointments draws investors' interest to a firm.

In contrast, for both expected and unexpected private-sector changes, the increase in the value of *CSAR* in the five trading days after publication is not significantly different from 0 ($p > .10$); increases in *CSAR* were 1.83 and 0.50 respectively.

Although long-term changes in cumulative standardized abnormal returns must be interpreted cautiously because nonrelated events may confound results, the increases in *CSAR* over the 30 days after an announcement indicate that investors' reactions to management change primarily takes place

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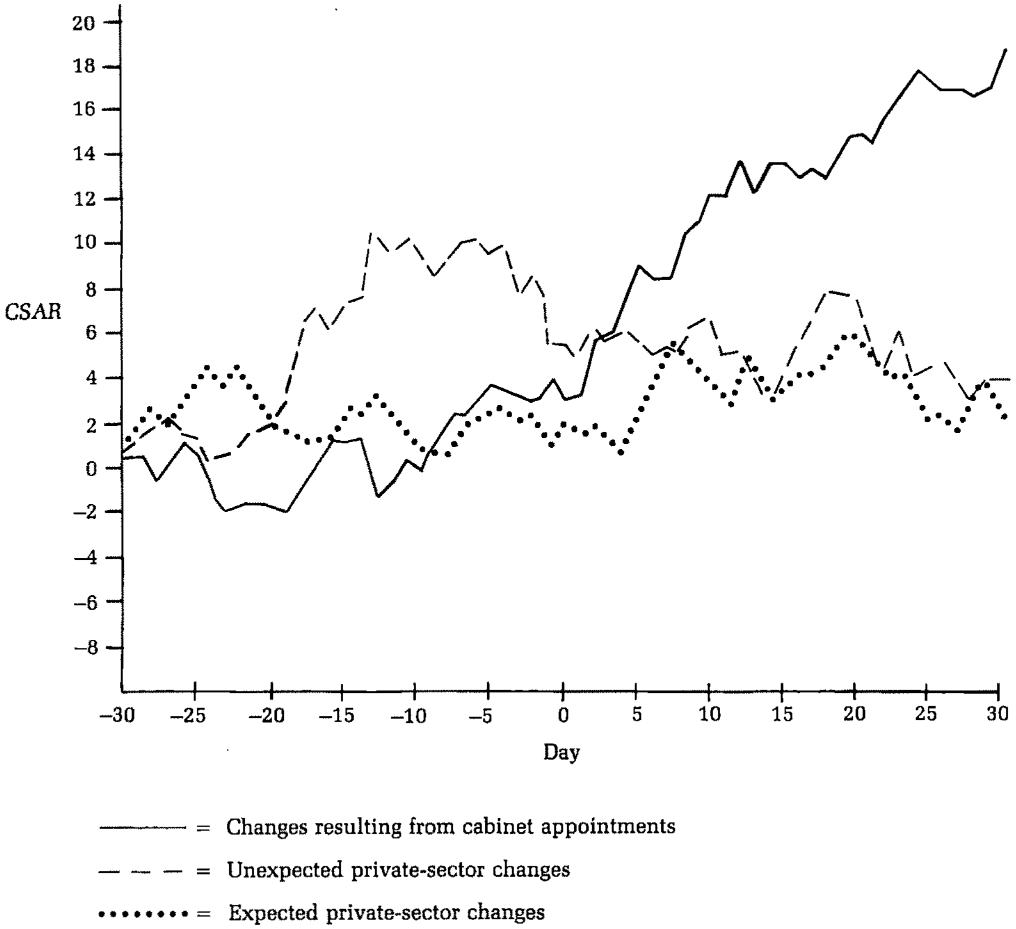
[11] Although two-day windows are normally used to capture excess returns, a wider interval is useful when information centered in an event may not be partially anticipated or when the full implications of an event are not disclosed at the announcement date.

FIGURE 1
Market-Adjusted Cumulative Standardized Abnormal Returns (*CSAR*)



within a week of publication. For the firms affected by cabinet appointments, 30 days later *CSAR* had grown to 18.768. However, from day 5 to day 30, it rose only 10.0 points, which is not significantly different from 0. Likewise, the change in *CSAR* for the month following an event for private-sector unexpected changes (−1.21) and expected changes (+.254) was not significantly different from 0.[12]

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[12] Market model adjustment showed similar results. For the five days after the change, the value of *CSAR* for cabinet appointment changes increased by 7.395; for the expected private changes, it increased by 2.591, and for the unexpected private changes, it decreased by 0.210. Only the first change was significantly different from 0 at the .05 level.

CONCLUSIONS

The results of this study suggest that investors perceive management changes resulting from cabinet appointments more favorably than they perceive other types of management change. Little effect contemporaneous with the announcement of such appointments is evident. The lack of immediate reaction resembles the lack of reaction to the expected changes and contrasts with the immediate negative reaction seen for unexpected changes. That pattern suggests that investors perceive cabinet appointments as at least positive enough to more than overcome any disruption brought about by the management change. The trend in *CSAR*, however, suggests that investors evaluated the prospects of firms that lost an executive to the cabinet more favorably than they had prior to the appointment and that the other two forms of management change had a less sustained influence on investors' perceptions.

Several explanations for those results can be suggested. First, investors may view a cabinet appointment as an indication of favorable future government policies toward a firm's industry or the firm itself. Second, an executive's appointment to a cabinet position may be followed by additional positive information on that individual's former firm. This study could not directly test those explanations or address whether investors' expectations are justified. The results do, however, have several implications for our understanding of relations between business and government. If the increase in a firm's stock value is a result of increased favorable information about the firm—in other words, if such an increase is a signal of strong management—both government and business should welcome such business-government exchanges. That interpretation would suggest that government is making use of skilled executives of well-managed firms. If, on the other hand, investors anticipate favorable government policies to result from such appointments, the implications of this study are more problematic. Although the government has taken steps to restrict the extent to which officials can promote private interests, those rules can be circumvented. It may be difficult to control for subtle expectations of favorable actions or policies that may influence investors' reactions.

Several limitations of this study should be noted. First, although we discovered no confounding events in our analysis of published reports, the use of a five-day time period for testing market reactions increases the possibility that extraneous events may have affected results. Moreover, the size of the data set was not sufficient to allow disaggregate testing, which might have shed further light on the reasons for investors' reactions to cabinet appointments. Further research could explore the effects of cabinet position, administration, and firm characteristics on the market's reaction to executive succession.

This study suggests other avenues of future research. As it did not investigate the actions taken by cabinet officials, one avenue would be to investigate more fully whether the investor expectations that led to positive market reactions to cabinet appointments were realized. Future research should also attempt to assess the influence of previous performance, successors' characteristics, and other variables on investors' reactions to a cabinet appointment.

Finally, we have added to an existing body of literature that cautions against considering management change as a unitary phenemenon. The effect of management change on firm performance is clearly more complex than was previously thought.

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FIGURE 1
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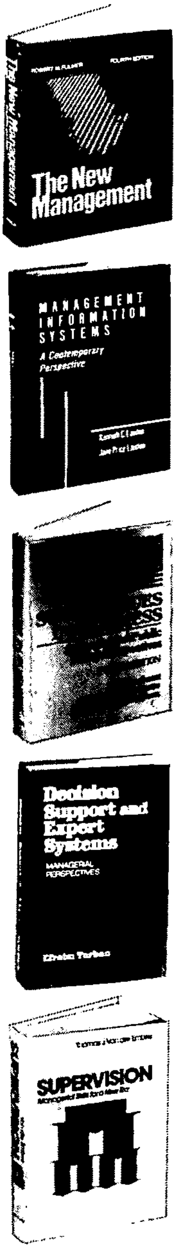

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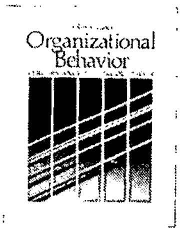
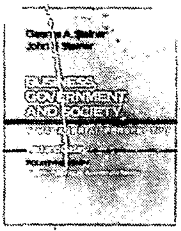

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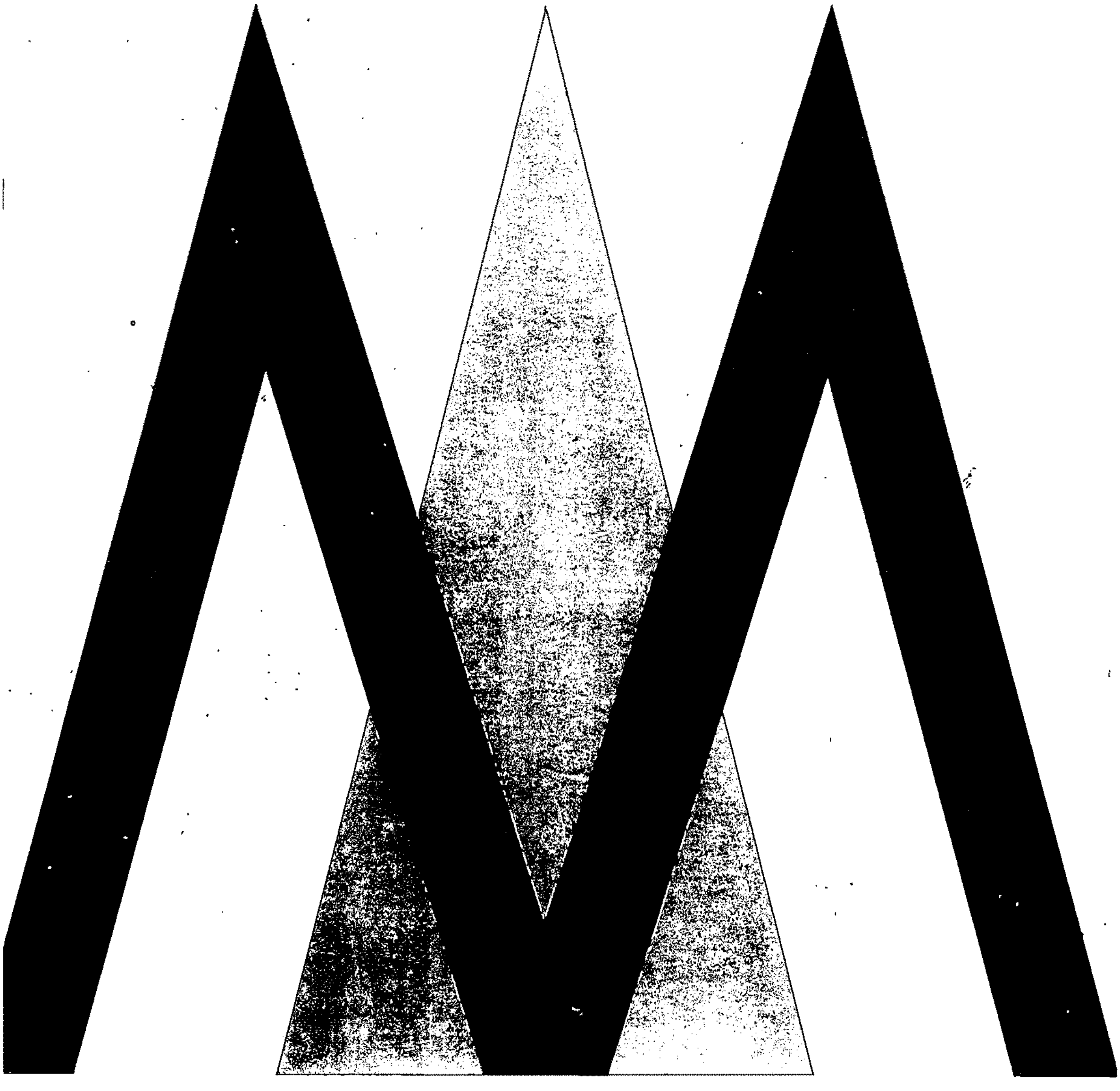

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FROM THE EDITOR

In her last official act as editor of the *Journal*, Janice M. Beyer compiled statistics summarizing all of the manuscripts that were submitted during the three years she held the position. The statistics appear below.

R.T.M.

Report to Readers

Because I agreed to consider revisions submitted until December 31, 1987, the final disposition of all papers submitted during my editorship was not known in time to be published in the March issue. A summary of the final disposition of papers submitted between July 15, 1984 and December 31, 1987, broken down by subfield, follows:

	Submitted		Rejected	Under Review	Accepted
Subfield	*N*	%	%	%	%
Business Policy	206	14.7	79.6	8.7	11.7
Careers	19	1.4	84.2	10.5	5.3
Entrepreneurship	12	0.8	83.3	16.6	0.0
Health Care	4	0.3	100.0	0.0	0.0
Human Resources	161	11.5	88.2	4.3	7.4
International Management	48	3.4	81.2	16.6	2.1
Industrial Relations	20	1.4	85.0	5.0	10.0
Management Education	26	1.9	96.1	3.8	0.0
Methods	16	1.1	93.8	0.0	6.3
Management Info Systems	16	1.1	93.8	6.3	0.0
Organizational Behavior	490	35.0	86.3	4.5	9.2
Organizational Communication	24	1.7	87.5	12.5	0.0
Organizational Development	18	1.3	88.9	5.6	5.6
Organizational Theory	206	14.7	76.7	9.2	14.8
Production/Operations Mgmt.	15	1.1	73.3	6.7	13.3
Public Sector	6	0.4	83.3	0.0	16.7
R&D	6	0.4	83.3	0.0	16.7
Social Issues	23	1.6	87.0	0.0	13.0
Women in Management	35	2.5	91.4	5.7	2.9
Miscellaneous	49	3.5	87.8	10.2	2.0
Overall	1,400	99.9	84.4	6.6	8.9

The assignment of a paper to a subfield is unavoidably subjective and sometimes rather arbitrary because much current research pertains to more than one subfield. The category "under review" includes papers on which revisions were encouraged but had not been resubmitted by December 31. The proportion accepted was lower for 1987 than prior years; some of these papers will undoubtedly be accepted as revised papers by Rick Mowday during his editorship. Early in my editorship, I accepted 6 papers originally submitted when Tom Mahoney was editor.

Janice M. Beyer

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IMPLEMENTING EXTERNALLY INDUCED INNOVATIONS: A COMPARISON OF RULE-BOUND AND AUTONOMOUS APPROACHES

ALFRED A. MARCUS
University of Minnesota

This research analyzed how nuclear power plants implemented safety review innovations introduced by the Nuclear Regulatory Commission after the Three Mile Island accident. The findings suggested that nuclear power plants with relatively poor safety records tended to respond in a rule-bound manner that perpetuated their poor safety performance and that nuclear power plants whose safety records were relatively strong tended to retain their autonomy, a response that reinforced their strong safety performance.

Innovations are ideas, formulas, or programs that the individuals involved perceive as new (Beyer & Trice, 1978; Hill & Utterback, 1979; Rogers, 1982; Zaltman, Duncan, & Holbeck, 1973). The stages in their development have been the subject of much scholarly discussion and debate (Rothwell & Zegveld, 1985; Strebel, 1987). A common view is that implementation follows conception, proposal generation, and initiation, and that the factors that facilitate the former inhibit the latter (Duncan, 1976: 172; Wilson, 1963: 200). Rule-bound approaches, which involve central direction and highly programmed tasks, are supposed to promote implementation; that is, the number of routine tasks prescribed from above should increase as an organization moves toward implementation (Wilson, 1963: 198). Conception, proposal generation, and initiation, on the other hand, require fewer controls and more autonomy, because diversity, openness, informality, and the ability to bring a variety of bases of information to bear on a problem need to be encouraged (Duncan, 1976: 174). Duncan suggested that making the transition from conception, proposal generation, and initiation to implementation

---

The author would like to thank Richard Osborn, Richard Widrig, Clare Goodman, Gene Duvernoy, Larry Crocker, Fred Allenspach, Bonnie Berk, and Mike Wood, who assisted him in carrying out this study. Phil Bromiley helped with the statistical analyses. An early draft was presented at the University of Minnesota Strategic Management Research Center Conference on Innovation in June 1987. Andrew Van de Ven, Bala Chakravarthy, and Paul Lawrence commented on this draft.

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can be difficult and that the "ambidextrous" organization, adept at moving from stage to stage, is likely to be rare (1976: 167).

Several authors (Burgelman, 1984; Kanter, 1985, 1986; Lawrence & Dyer, 1982; Strebel, 1987) have dealt with the problem of a dominant corporate culture in established firms that is centered around rules that tend to stifle innovation. They suggest that for innovation to occur, spin-offs, independent task forces, and autonomous teams that simulate entrepreneurship are necessary. Their analysis primarily applies to internally generated, opportunity-driven innovation (Andrews, 1971; Bourgeois, 1984; Child, 1972). However, many innovations arise when an unanticipated external threat or challenge occurs.

The insight that crises, dissatisfaction, tension, and significant external stresses play an important role in bringing about innovations is a common one (Bateson, 1979; Crozier, 1964; Cyert & March, 1963; Downs, 1967; Kelly & Kranzberg, 1975; Meyer, 1982; Schon, 1971; Zaltman & Duncan, 1977). Because people are programmed to "focus on, harvest, and protect existing practices" (Van de Ven, 1986: 591), they are likely to resist new practices and programs (Gricar, 1983; Leonard-Barton & Kraus, 1985; Rogers, 1982; Rothman, 1974; Schultz & Slevin, 1975; Sturdivant, Ginter, & Sawyer, 1985; Zaltman & Duncan, 1977; Zander, 1977). To stimulate the introduction of the new practices, disruptive events, which threaten a social system, may be needed. In fact, Terreberry (1971: 69) maintained that innovations are largely a matter of external inducement.

The problems that surface during the implementation of externally induced innovations, however, can thwart technological improvement and distort the innovation process both directly and indirectly (Ettlie & Rubinstein, 1981; Rothwell, 1981; Schwietzer, 1977). Little attention has been devoted to those problems. This study compared the effects of using rule-bound and autonomous approaches to deal with the implementation of externally induced innovations.

THE LITERATURE ON IMPLEMENTATION

A large body of research deals with the problems of implementation. Early case studies (Bardach, 1977; Marcus, 1980; Pressman & Wildavsky, 1974) supported the view that excessive decision-making autonomy during implementation is counterproductive. When numerous decisions have to be made and many participants are involved, the probability of success decreases, and the possibility of unexpected problems arising increases. Critics (Berman, 1980; Elmore, 1979; Lipsky, 1978; Palumbo, Maynard-Moody, & Wright, 1983; Thomas, 1979) of that literature, however, have contended that implementors have a greater knowledge than their superiors of multiple and contradictory demands and of conflicting legal, political, professional, and bureaucratic imperatives at the point of delivery (Rein & Rabinowitz, 1978), that denial of adequate autonomy is likely to affect the disposition of implementors negatively, and that their dispositions are often critical to assuring a policy's success (Edwards, 1980; Van Meter & Van Horn, 1975). According to Fidler and Johnson, implementors can engage in "routine, mechanical operationalization" (1984: 704), which can sabotage or impede successful implementation, if they are not given the opportunity to make modifications that are based on their experience.

Bourgeois and Brodwin (1984: 241–242) identified five models of implementation, including a "commander" model that roughly corresponds to a rule-bound approach and a "crescive" model that roughly corresponds to an autonomous approach. The commander model has a strong normative bias toward central rule-making and enforcement; the crescive model draws on managers' natural inclinations to develop opportunities as they see them in the course of day-to-day management. Bourgeois and Brodwin (1984: 260–261) maintained that although none of the approaches that they identified is correct in all situations, greater use should be made of the crescive model, especially in environments characterized by frequent change (cf. Mintzberg, 1978; Nutt, 1983).

Linder and Peters (1987: 462) summarized the literature on implementation by arguing that two schools, embracing approaches similar to either the rule-bound approach or the autonomous approach, have emerged. The first views implementation problems from the vantage point of a central authority who wants to see subordinates follow rules to carry out his or her policies. The second accepts that people in the lowest echelons of an organization exhibit autonomy by redefining policies during the course of implementation. Rather than a command-and-control perspective, the autonomous approach emphasizes that bargaining takes place and that changes in policies occur during implementation (Linder & Peters, 1987: 462). The autonomous approach is closely aligned to an evolutionary view in which policies unfold rather than being centrally imposed (Majone & Wildavsky, 1978).

Several empirical studies (Beyer & Trice, 1978; Guth & Macmillan, 1986; Maynard-Moody, Musheno, Palumbo, & Oliverio, 1987) have supported the view that autonomy is often needed to facilitate implementation. Beyer and Trice concluded that "if upper management wants better performance [in implementing policy] . . . , it will have to grant . . . more influence in decisions; . . . directors will have to grant more autonomy to their subordinates" (1978: 264). They reasoned that people are unlikely to take responsibility for implementing something new unless they have discretion and are accustomed to taking responsibility. Guth and Macmillan found that if general management imposes its decisions, "resistance by middle management can drastically lower the efficiency with which the decisions are implemented, if it does not completely stop them from being implemented" (1986: 321). Middle managers who believe that their self-interest is being compromised can redirect a strategy, delay its implementation, or reduce the quality of implementation. Maynard-Moody and colleagues found that "empowered street-level workers of decentralized human service organizations play a more substantial role in the successful implementation of social policy than do less empowered workers in highly bureaucratic organizations" (1987: 1).

Only Nutt (1986, 1987) appeared to find mixed support for autonomy. In the innovations he analyzed, upper managers had the highest success rates in installing planned changes in organizations when they justified the need for change and played a critical role in formulating a plan, illustrating how performance could be improved, and showing how the plan would improve performance.

INNOVATIONS IN THE NUCLEAR POWER INDUSTRY

In *Normal Accidents: Living with High-Risk Technologies*, Perrow suggested that a major dilemma in the organization and management of nuclear power plants is how to balance rule-bound and autonomous approaches:

> High risk systems have a double penalty; because normal accidents stem from the mysterious interaction of failures, those closest to the system, the operators, have to be able to take independent and sometimes quite creative action. But because these systems are so tightly coupled, control of operators must be centralized because there is little time to check everything out and be aware of what another part of the system is doing. An operator can't just do her own thing; tight coupling means tightly prescribed steps and invariant sequences that cannot be changed. But systems cannot be both decentralized and centralized at the same time (1983a: 10).

In a paper published the same year as *Normal Accidents*, Perrow (1983b) developed some of the arguments for operator autonomy. He maintained that efforts to centralize authority and to control the actions of operators—reducing their role to passive monitoring so that they no longer have significant decisions to make—end up deskilling the operators and increasing the chances of error. Such efforts encourage low system comprehension, low morale, and an inability to cope with anything but the most routine conditions. Autonomy is needed to encourage a high level of commitment and knowledge. Similarly, Weick (1987: 122–123) highlighted the importance of autonomy but suggested that a balance between autonomy and rules is necessary to achieve reliability in high-risk technologies.

Hypotheses

On the basis of the empirical literature, it appears that the more that managers exercise choice within a situation of constraints (cf. Hrebiniak & Joyce, 1985), the better the outcomes will be.

> *Hypothesis 1: When managers retain autonomy, externally induced innovations will be positively related to the safety of nuclear power plants.*

The concept of self-perpetuating organizational cycles (Masuch, 1985) is relevant here. Masuch maintained that in trying to avoid undesired outcomes, organizations actually can contribute to them. If the prior safety record of a plant is poor, managers will feel that they have little latitude: they have to carry out rules precisely as they have been written. The tendency of nuclear power plant managers and regulators to become more rule-conscious when a plant has had a number of unsafe events may explain rule-bound behavior. On the other hand, if the prior safety record of a nuclear power plant is good, its managers are likely to enjoy increased discretion. Regulators are less likely to intervene in day-to-day decision making, which may partially explain autonomy.

Two cycles are likely to exist in implementing externally induced innovations.

> *Hypothesis 2: Organizations with poor safety records respond with rule-bound behavior, a response that perpetuates poor safety outcomes.*
>
> *Hypothesis 3: Organizations with good safety records retain their autonomy, a response that reinforces their strong safety records.*

Evidence for the existence of a vicious (Hypothesis 2) and a beneficent (Hypothesis 3) cycle comes from an examination of safety review innovations introduced by the Nuclear Regulatory Commission (NRC) at nuclear power plants after the accident at Three Mile Island.

Background on the Three Mile Island Study

The NRC, industry, public interest lobbyists, and academics thoroughly studied the incident at Three Mile Island, one of the worst industrial accidents in history. Some of that work was quite pessimistic about the prospects for safety in the nuclear power industry. Ford (1981), for example, found inertia and unwillingness to change. Perrow (1983a) suggested that accidents were inevitable and that little could be done to prevent them. Many analysts (Perrow, 1983b) attributed what went wrong to human error (Egan, 1982). Apparently, as a result of repeated assurances that the technology was safe, there was a mindset that the equipment was infallible and a preoccupation with the technical aspects of nuclear power, rather than with the human dimensions (Sills, Wolf, & Shelanski, 1982). Institutional and organizational inadequacies were said to have contributed as much to the accident as mechanical breakdowns.

According to investigations of the accident, one of the reasons it took place was that lessons had not been learned from similar events that had occurred at other nuclear power plants (Rogovin, 1979). Even before the Three Mile Island accident, there was concern about an increase in the number of unsafe events at nuclear power plants. The occurrence of such events had outpaced the growth in the number of new nuclear power plants, escalating from about 90 a year in 1970 to more than 3,000 a year in the late 1970s (Del Sesto, 1982).

The NRC introduced independent safety engineering groups after the Three Mile Island accident (Office of Nuclear Reactor Regulation, 1980) to deal with this problem. It proposed that all newly licensed power plants should have such groups in order to learn appropriate lessons and to implement prevention strategies. Neither the nuclear power industry nor the utilities within it sought the introduction of safety review groups; such groups had been thrust upon them by the NRC because of the unfortunate Three Mile Island accident.

This structural innovation, which the NRC developed in revised standard technical specifications, was unique in at least three ways. First, there was a focus on safety incidents and their prevention, that is, on examining safety incidents at the plant involved and at other, similar plants, to discover ways to improve safety. Second, the NRC for the first time proposed that newly licensed nuclear power plants have a full-time safety review staff—the independent safety engineering group—which was to be composed of five engineers (it was unclear why the NRC chose that number). Third, the NRC proposed that the five engineers be independent of nuclear power production; they were to be on-site reporting to someone off-site who was not in the chain of command for power production.

Four dimensions proposed by Beyer and Trice (1978) can be used for assessing the extent of the change in practice that the innovation represented. The new resources required were evidence of the *magnitude* of the task. The safety groups were expensive additions, as the five full-time engineers could cost a nuclear power plant more than half a million dollars annually. The independent safety groups also had a *pervasive* character because, as developed in the standard technical specifications, a group's full-time engineers were supposed to devote exclusive attention to examining safety incidents and to suggesting ways to prevent them. The presence and functioning of a safety group was supposed to make all employees at a plant become more safety conscious. The *novelty* was that safety engineers outside the chain of command for nuclear power production were interacting with operators and production workers and trying to influence their behavior. Clearly, the innovation was extensive.

The only aspect of the safety group's innovativeness that was not evident was its *duration*: how long would the NRC be committed to the innovation in the form in which it was proposed? Soon after requiring that newly licensed plants implement an independent safety engineering group, the NRC initiated a study to review the groups and other safety review procedures at nuclear power plants to determine if safety review groups should be extended to all power plants or if safety review systems at nuclear power plants should be revised in some other way.

METHODS

In analyzing the approaches nuclear power plants took toward implementing independent safety engineering groups, this study used both qualitative and quantitative methods. The NRC establishes standard technical specifications when it regulates nuclear power; individual plants then are allowed to customize those requirements in individual technical specifications that the NRC must approve. The technical specifications of individual power plants and interviews held at some of those plants were used to classify the implementation approaches, which were then related to safety outcomes and other measures of nuclear power plant performance.

The data were collected at the end of 1981, when the United States had 72 licensed nuclear power plants. The accident at Three Mile Island took place in April 1979. After numerous reports about the accident had appeared, the NRC established the safety review group requirement in September 1980 (Office of Nuclear Reactor Regulation, 1980). To add the five full-time engineers the requirement mandated necessitated a long lead time because of shortages of skilled people in the nuclear power industry. Moreover, the adjustment of nuclear power plants to the post-Three Mile Island situation was long and complex because of the many other changes that the NRC required: the Three Mile Island Action Plan had over 100 items. This research took place between September 1981 and September 1982 and reflected the state of implementation at that time.

In carrying out the research, a team of analysts and I compared the administrative sections of the technical specifications of 24 nuclear power plants with the administrative section in the NRC's standard technical specifications. The six plants that had been licensed after Three Mile Island were chosen for close scrutiny, as were 18 other randomly selected plants. Through the mediation of the NRC, we conducted interviews at 13 of the 24 plants whose technical specifications we had examined. The interviews confirmed the impression of rather slow adjustment by plants in the post-Three Mile Island period. They also showed that in many cases the technical specifications were incomplete or inaccurate. Thus, the interviews provided a check on the technical documents, and the analyses reported here are confined to the 13 plants for which interview data were available. Six of those plants were licensed after the accident and seven were licensed before it.

The plants were located in the eastern, midwestern, and southern United States. They had different reactor types (pressurized water or boiling water), reactor suppliers (Westinghouse, Babcock and Wilcox, or General Electric), architectural engineers, dates of initial commercial operation, and electrical power generating capabilities. The utility systems to which they belonged differed in their structure, size, and profitability.

Three days were spent at most of these facilities, with visits to both the corporate office and the plant site. To assure objectivity, interviews were conducted by a team that included me and at least one person with a disciplinary background different from mine. Usually that person was an engineer with some nuclear power training. In most cases the members of the team did separate interviews. We carried out 80 open-ended interviews with safety review staff members at 13 plants between February and September 1982.

Questions were posed about why a particular method of safety review was chosen and how that method of safety review operated (see the Appendix). The questions covered the pre-Three Mile Island requirement that plants have plant and corporate safety review groups as well as the post-Three Mile Island requirement that newly licensed plants have an independent safety engineering group. As the interviews were designed as a check on the document analysis, they followed the format of the technical specifications, with questions about the rationale, mission, composition, major tasks, processes, output, and workflow relations of the safety review groups at a nuclear power plant. Although the questions were standardized, with their precise sequence and wording determined in advance, interviewers were encouraged to probe for additional responses and to obtain other types of feedback when appropriate.

Variables and Measures

On the basis of the document analysis, the interviews, and the other information that was available, I developed the following measures.

Implementation approaches. I relied on the documentary record and the interviews to construct a typology of implementation approaches. The primary distinction I made was between *rule-bound* behavior, operationally defined as compliance with the standard technical specifications, and *autonomy*, defined as customizing those guidelines through the adoption of unique, plant-specific characteristics.

To ensure coding reliability, I had at least three members of the research team play a role in the analysis. They independently classified the safety review systems of the plants they had visited on the basis of the documents examined and the interviews conducted. The documents were primarily the technical specifications, but during the site visits safety review staff often volunteered additional documents.

As a further check on this analysis, two steps were taken. First, I shared our classification of the plants with the NRC officials responsible for the independent safety group program. Second, I showed copies of the classification to the safety review staff members who had been interviewed. As Patton (1980) remarked, analysts can learn a great deal about the accuracy of their findings from their subjects' comments. Those checks indicated that there was a consensus among the nuclear power plant staff members, the analysts, and the NRC about the classifications made.

Safety outcomes. Reports of unsafe events, which the NRC receives in the form of "license event reports," are one of the main methods that nuclear power plants and the regulatory agency have for assessing safety.[1] Events attributable to human error, such as failure to follow a procedure, constitute anywhere from a third to a quarter of the total number of reports. Significant events involve serious deficiencies in major safety-related systems because of which the NRC may require that a nuclear power reactor be shut down. The main safety outcome that I used was the number of unsafe events attributable to human error that occurred in 1982. I assumed that events occurring in 1981 came before the implementation of the new safety review systems and that events occurring in 1982 came after implementation. Comparable records for the total number of human factor and the total number of significant events in 1981 and 1982 were not available, because in the interval the NRC changed the way it defined those categories.

---

[1] See Osborn and Jackson (1987) and Olson, McClaughlin, Osborn, and Jackson (1984) for a discussion of license event reports and other methods of assessing nuclear power safety.

Other performance measures. There are drawbacks to using license event reports as a measure of safety. Some plants tend to report events more readily than others, and differences in amounts of on-line time and other operational features can affect a nuclear power plant's susceptibility to events. Because of those limitations, I examined other performance measures as well. The NRC has selectively assessed the management capabilities of nuclear power plants on the basis of various criteria. According to those assessments, if a plant is given a rating of 1, it means that management attention and involvement are "aggressive"; a rating of 2 means that management attention and involvement are "adequate"; and a rating of 3, that "weaknesses are evident." Those criteria, which do not depend on self-reporting by the plants, may be less prone to manipulation by plant managers than are license event reports. However, they are highly subjective inasmuch as they depend on the impressions formed by NRC staff members during fairly brief site visits. The NRC is aware of that limitation and, largely for that reason, has discontinued the management assessments. I, therefore, relied primarily on the license event reports and used the management ratings only in a supplementary fashion.

To correct for different amounts of on-line time and other operational features that can affect the number of events a plant has, I examined 1982 plant capacity ratings. Capacity ratings show the percentage of electric power that a nuclear power plant has generated in a particular period in comparison with the amount that it could generate given its overall capacity. This indicator is very important to nuclear power plant managers, and some even have instruments on their desks that provide them with up-to-the-minute reports of their progress.

Capacity ratings have significance for two reasons. First, a plant can have few events because it has been shut down for a significant period of time; that can occur because of technical problems, or it can be the result of a reduced demand for power. If a plant has been shut down for a long time, it will show up in low capacity ratings. The second reason for examining capacity ratings is that variations in the number of events can occur because of trade-offs that nuclear power managers make among different measures of performance. Conflict among competing performance goals has been noted by many scholars (Cyert & March, 1963; Dill, 1965; Miles & Cameron, 1982; Sonnenfeld, 1982). Safety can be jeopardized to increase productive efficiency, or productive efficiency can be sacrificed for the sake of safety. If a plant has sacrificed safety, a higher capacity factor combined with a lower safety rating may result.

Controls. Other factors besides the implementation approaches may have caused the variations in outcomes that occurred. I therefore introduced the following control variables into the analysis.

Age. Plants that were newer in terms of years of commercial operation in 1982 may have had more safety events because of start-up problems. Also newer plants may have had more violations because the NRC tends to impose additional rules over time. However, older plants may have had difficulties because of equipment obsolescence and maintenance failures.

Profitability. Utilities that were profitable in terms of return on equity in 1981–82 may have had the resources to be able to pay for increased safety; on the other hand, less profitable utilities may have had to make sacrifices to maintain plant safety.

Size. A large commitment to nuclear power, measured by net megawattage of operational nuclear capacity in 1982, may have meant possession of the overall technical resources necessary to run fairly safe plants; but a small commitment may have meant less bureaucracy and more flexibility and therefore an ability to manage nuclear power plants more safely.

Long-term debt. High debt measured as long-term debt in 1981–82, may have meant high spending on staff and other items related to safety, or it may have meant that a utility had little slack to pay for safety.

Analysis strategy. To determine if there were significant correlations between the two approaches to implementation and the other variables, an intercorrelation analysis of all the variables in the study was carried out. For Hypothesis 1, I compared the safety and performance outcomes of plants having rule-bound and autonomous approaches. To test for the significance of the differences between means, *t*-statistics were computed.

For Hypotheses 2 and 3, two determinations were necessary. (1) Did a plant's prior (i.e., 1981) safety record influence its implementation approach? (2) Did the implementation approach then affect the number of safety events attributable to human error in 1982? A probit analysis was necessary to test whether a plant's prior record affected its implementation approach because the dependent variable is dichotomous, with the approach either rule-bound or autonomous. To test whether the implementation approach affected subsequent safety outcomes with age, profitability, size, and long-term debt controlled for, I conducted a series of regression analyses including prior performance and, because of the small number of degrees of freedom available, various combinations of the other control variables.

RESULTS

Implementation Approaches

I classified five plants as rule-bound and nine as autonomous. Because some plants were required to have an independent safety engineering group and others were not, the types of responses classified as rule-bound were: (1) Two plants had engineering groups exactly like those the NRC proposed. The NRC's standard technical specifications matched precisely what these nuclear power plants had adopted. This response was called obedience. (2) Plants licensed before the Three Mile Island accident did not have to have an independent safety group or equivalent. For those plants, rule-bound behavior meant doing what the NRC expected and little more; with very minor exceptions, their technical specifications precisely matched the applicable

NRC standards. To the extent that they modified their behavior after the Three Mile Island accident, they created subcommittees as appendages to their part-time safety groups (two plants) or added a single full-time safety review position (one plant). This response was called incremental adjustment (cf. Lindblom, 1959; Quinn, 1980).

These responses were classified as autonomous: (1) Some plants licensed after the Three Mile Island accident were in the process of creating a corporate nuclear safety review department with responsibility for both off-site review and on-site safety engineering. The head of this department had vice-presidential status and reported directly to a top utility executive. Because the purpose of this new safety review component was to build an entirely different type of organizational structure to achieve the intent of the NRC's guidelines, we labeled this response (found at two plants) modification.

(2) At two other plants the existing quality assurance function was combined with safety engineering. Managers at these plants decided on their own to add the five full-time safety engineers to their existing quality assurance staff. Doing so altered the nature of what the NRC intended. The distinction the NRC was trying to make was between the "policeman" role that quality assurance traditionally performed and the ability to challenge existing procedures that the independent group was supposed to carry out. This response, therefore, was called combination.

(3) Significant planned and actual alterations of safety review systems at plants licensed before the Three Mile Island accident were not required. When such plants made these changes, they were acting on their own initiative, in response to what they believed to be the lessons of the incident. Some of the plants planned for adoption of a safety review system, taking comprehensive steps to consider what they might do. Two plants, for example, did detailed studies that would have created an entirely different type of system. The proposed technical support group that they intended to create would have aided existing review groups as well as having responsibilities of its own. Partial staffing had started, even though implementation was not obligatory, with full staffing taking place only if an independent safety engineering group or equivalent were mandated. This response was called planning.

(4) A different response was to create a group like an independent safety engineering group that was the equivalent of what the NRC proposed, not because the NRC required it, but because management believed that such a group was necessary. To the extent that these plants complied with the NRC's proposal, they did so voluntarily, taking the initiative, and did not act because of NRC pressure or fear of NRC disapproval. The response of these two plants was called anticipation.

Obedience and anticipation. Although it is not possible to take full advantage of the qualitative analysis because there was so much material (cf. Marcus & Osborn, 1984), a revealing comparison summarizing some of the major differences between obeying and anticipating plants can be made. At the two plants that obeyed, the offices of the independent safety engineering group were located in a temporary structure in the parking lot, and group members had to obtain visitors' badges before entering the plants. The plants' staff maintained that the safety group's role had not been well defined, that it did not fit in with existing practices, and that it was not likely to have a major impact. The safety group was making many recommendations, but the plants were not adopting those recommendations. The plant manager pointed to a huge stack of papers in the corner of his office and said, "Do you know how many of these [recommendations] we have acted on?" Showing a space of about a quarter of an inch between his thumb and forefinger, he continued, "that much."

In contrast, at the plants that anticipated, safety review managers maintained that the group resembling an independent safety group had technical potential, was compatible with existing practices, and could have an important impact. Interviewees at such plants said that the group's members had "years of operating experience," were capable of understanding the plant's personnel, had an appreciation for "what was possible," and could "put in perspective" whether something was "significant." Their recommendations, both formal and informal, were accepted and were "promptly carried out."

The structures of the safety groups at these plants were similar. Both at the obeying and anticipating plants, there were five engineers on-site who reported off-site to someone in the corporate office. The primary emphasis of the independent safety group was on events at a plant and at other plants that might indicate ways to improve safety. The major difference between the two types of plants concerned their approach to implementation. Relinquishing freedom and control to an external agent (the NRC) when preferred states had been disturbed by an unwelcome surprise (the Three Mile Island Accident) created resistance, but independently tailoring a response to conditions at a plant resulted in acceptance and understanding.

Safety Outcomes

Table 1 presents the intercorrelations of all the variables in the study. As can be seen, autonomy is significantly correlated ($p < .05$) with a low occurrence of events in 1981 and 1982 and very significantly correlated ($p < .001$) with a low occurrence of human error events. These findings support Hypothesis 1.

There are also significant correlations between autonomy and high profitability, between low profitability and the number of events in 1982, and between low profitability and a high number of human error events. The overall number of events is significantly correlated with the overall number of human error events but not with the number of significant events; the reason may be that significant events represent a situation that has dramatically deteriorated, but human error events and general events represent precursor circumstances.

Significant correlations also exist between age and the number of events in 1981 and between long-term debt and the number of events in 1981. There are a number of ways to interpret these findings. Experience may be a factor in reducing the number of events, older technologies may be safer, or the correlation may simply represent increased reporting requirements that the NRC has imposed on newer plants. Plants belonging to utilities with high debt also had fewer events and in 1982 had fewer significant events. That finding could reflect a spillover effect on safety of a utility's long-term capital commitments.

Table 2 shows that the plants classified as autonomous outperformed the plants classified as rule-bound on nearly every performance indicator, with long-term debt the only exception. The smallest differences in outcomes are in the capacity ratings. Thus, it appears that productive efficiency was not sacrificed for the sake of safety, nor was safety jeopardized for the sake of productive efficiency.

The largest differences between the rule-bound and autonomous plants are in the number of human error events. Rule-bound plants had more than three times the number of human error events than the autonomous plants. Significant differences also exist with respect to events in 1981 and 1982 and with respect to profitability. Autonomous plants had fewer events and were generally more profitable. These findings support the hypothesis that autonomous implementation approaches do better than rule-bound approaches with regard to safety and other indicators.

To test for the existence of the hypothesized vicious and beneficent cycles (Hypotheses 2 and 3), I first made a determination about the effects of past events on implementation approaches. The probit analysis showed that the number of 1981 events correctly identified 85 percent of the implementation approaches (see Table 3). The adjusted R^2 value, .91, supports the hypothesis that a poor safety record leads to rule-bound behavior.

Table 4 shows the results of four regression analyses assessing the effect of the implementation approaches on 1982 performance. Different combinations were analyzed because the *N* is so small. The relationship between implementation approaches and human error events is strong, even after the introduction of the control variables. Implementation approach is the only variable with a significant value in each regression equation.

Thus, the probit analysis and regression results support Hypotheses 2 and 3. Plants with a poor 1981 safety record tend to respond in a rule-bound manner, a response that only perpetuates their poor safety performance, and plants with a strong 1981 safety record tend to respond in an autonomous way, a response that reinforces their strong safety record.

DISCUSSION AND IMPLICATIONS

After the Three Mile Island accident, nuclear power plants became pervious to outside forces; the NRC introduced new organizational arrangements for safety review management. Some power plants followed the guidelines the NRC established; others customized those guidelines to fit their individual circumstances. I called the former approach rule-bound and the latter approach autonomous and related those approaches to safety outcomes and

TABLE 1
Descriptive Statistics and Correlations Between Variables[a]

Variables	Means	Standard Deviations	1	2	3	4	5	6	7	8	9	10
1. Implementation approach[b]	0.62	0.51										
2. Events, 1981	66.00	29.33	−.75									
3. Events, 1982	69.85	38.84	−.83	.80								
4. Human error events	19.92	11.85	−.98	.69	.80							
5. Significant events	3.85	2.76	−.16	.52	.26	.03						
6. Management rating	1.73	0.42	−.41	.05	.25	.35	−.04					
7. Capacity rating	60.68	12.85	.10	.02	.32	−.05	.03	−.46				
8. Profitability[c]	12.59	1.57	.58	−.30	−.59	−.59	.18	−.54	−.02			
9. Age	6.92	4.86	.43	−.61	−.53	−.46	−.38	.29	−.40	−.13		
10. Size	1,948.30	994.89	.02	−.00	.03	−.11	.16	.35	.03	.26	−.21	
11. Long-term debt[d]	45.46	3.89	.35	−.57	−.39	−.19	−.59	−.47	.27	.30	−.10	−.23

[a] $N = 13$. Correlation coefficients above .49 are significant at $p < .10$; those above .57, at $p < .05$; those above .71, at $p < .01$; and those above .82, at $p < .001$.

[b] Rule-bound = 0, autonomous = 1.

[c] Profitability was measured as a percentage of return on average common equity.

[d] Long-term debt was measured as a percentage of year-end capitalization ratios.

TABLE 2
A Comparison of Rule-bound and Autonomous Implementation Approaches[a]

	Rule-bound		Autonomous			
Variables	Means	Standard Deviations	Means	Standard Deviations	t	p
Events, 1981	92.6	26.4	49.4	16.0	−3.71	.003
Events, 1982	109.2	33.1	45.3	12.7	−5.01	.000
Human error events	34.0	3.2	11.1	2.3	−15.08	.000
Significant events	4.4	3.8	3.5	2.1	−0.55	.590
Management rating	1.9	0.3	1.6	0.5	−1.50	.161
Capacity rating	59.1	17.9	61.7	9.8	0.35	.736
Profit[b]	11.5	1.6	13.3	1.2	2.35	.039
Age	4.4	2.2	8.5	5.5	1.57	.145
Size	1,922.4	568.9	1,964.5	1,229.3	0.07	.944
Long-term debt[c]	43.8	4.4	46.5	3.4	1.25	.238

[a] For the rule-bound plants, $N = 5$; for the autonomous plants, $N = 8$.

[b] Profitability was measured as a percentage of return on average common equity.

[c] Long-term debt was measured as a percentage of year-end capitalization ratios.

TABLE 3
Results of Probit Analysis of Effects of Past Safety Record on Rule-bound and Autonomous Implementation Approaches[a]

Independent Variables	Maximum Likelihood Estimates	Standard Errors	Maximum Likelihood Estimate/ Standard Error
Constant[b]	8.14	5.34	1.52
Past safety record[c]	−0.12	0.08	−1.52
Adjusted $R^2 = .91$			

[a] Percent predicted correctly = .85.

[b] Rule-bound = 0; autonomous = 1.

[c] The past safety record was measured as the total number of safety-related events in 1981.

various other measures of the performance of nuclear power plants and found that prior safety outcomes affected implementation approaches. Poor safety performance restricted choice. It yielded rule-bound approaches that perpetuated poor safety outcomes. A good record, on the other hand, opened a zone of discretion. It preserved autonomy, which resulted in continued strong safety performance.

Autonomy is the outcome of a good safety record and contributes to a good safety record. That is the essence of a self-perpetuating cycle—it is hard to break. If poor performers are given more autonomy, this analysis suggests, their safety record is likely to improve; but this analysis also suggests that they are not likely to be given more autonomy precisely because they are

TABLE 4
Results of Regression of Human Error Events on Implementation Approach and Other Variables[a]

Independent Variables	Controlling Prior Events	Controlling Age and Profits	Controlling Size and Long-term Debt	All Six Variables
Constant	37.60	43.83	14.93	28.65
	(3.83)	(8.78)	(6.84)	(22.60)
Implementation	24.54*	−20.48*	−24.09*	−22.71*
approach[b]	(2.28)	(2.42)	(1.10)	(1.10)
Events, 1981	−0.39			−0.18
	(0.39)			(0.65)
Age		−0.24		−0.21
		(0.21)		0.28
Profitability		−0.76		−0.57
		(0.71)		(0.54)
Size			−0.74	−0.82
			(0.54)	(0.81)
Long-term debt			0.47*	0.36
			(0.15)	(0.34)
Error term	2.66	2.70	1.80	1.98
	(0.52)	(0.53)	(0.35)	(0.39)
Adjusted R^2	.95	.95	.98	.97
(N = 13)				
F (entire equation)	114.07*	74.01*	170.29*	70.73*

[a] Ordinary least squares regression used; unstandardized coefficients reported. Standard errors are in parentheses.

[b] Rule-bound = 0; autonomous = 1.

* $p < .01$

poor performers. That is the essence of a vicious cycle. Thus, I have presented evidence for the existence of a vicious cycle in which poorly performing nuclear power plants have their choices narrowed, which leads to continued poor performance, and evidence for the existence of a beneficent cycle in which nuclear power plants with stronger performance retain their autonomy, which perpetuates their strong safety performance. The findings suggest that the potentially most dangerous plants are the least likely to benefit from the innovations introduced by the NRC after the Three Mile Island accident and that the least dangerous plants are the most likely to benefit. Thus, in the short run, the performance gap between the strong and weak plants increases.

As was shown in the literature section, many studies of the implementation process have been carried out. Most of them have focused on social policies. Although an older tradition (Duncan, 1976; Pressman & Wildavsky, 1974; Wilson, 1963) suggests that rule-bound behavior is necessary during implementation, most recent studies (Bourgeois & Brodwin, 1984; Guth & Macmillan, 1986; Lipsky, 1978) have put greater emphasis on autonomy.

This study addressed how an externally induced innovation affects the organization and management of a high-risk technology and showed that autonomy is needed. The more managers exercise choice within a situation of constraints, the better the outcomes are.

Thus, this study's results are consistent with the results obtained in research examining implementation of social programs (Beyer & Trice, 1978; Maynard-Moody et al., 1987). Implementation is likely to be more effective when policy implementators are free to design and determine the specifics. The reasons include the following: (1) Policy formulators may not possess sufficient information at the level at which policy is carried out. Implementors are likely to have greater knowledge at the point of delivery, where there are multiple and contradictory demands. (2) Efforts to centralize authority and control the actions of implementors may deskill those who carry out policy and increase chances of error. Such efforts may encourage low system comprehension, low morale, and an inability to cope with anything but the most routine conditions. Autonomy is needed to encourage high levels of commitment and knowledge. (3) In particular, the disposition of implementors is likely to be negatively affected if they are not granted a sufficient level of autonomy, and it is their dispositions that are often critical to assuring a program's success.

Autonomy is needed for organizations to go beyond mere formal compliance to identification and internalization (cf. Kelman, 1961). In this respect, it resembles market-driven processes, which rely on individual initiative and competence to achieve objectives that cannot be accomplished by central direction. The peculiar advantage of market-like processes is their dependence on search, trial and error, and experimentation at the point of delivery, where specialized knowledge and skills are needed (Schultze, 1983). If implementors have flexibility to customize external demands, implementation is likely to be with the spirit, not the letter, of the law, and particular outcomes are likely to be enhanced.

Managers therefore should be aware of the possible consequences of blind acceptance of external dictates, and regulators should take heed of companies that strictly obey the law. These companies may not achieve the results the regulators intend.

Of course, there are important limitations to our findings. The small number of plants studied, the use of judgment in coding the implementation approaches, and the possibility that reports of events were inaccurate all limit the generalizability and validity of the findings. Additional research on the implementation of externally induced innovations after crises like the accident at Three Mile Island and on the organization and management of high-risk technologies like nuclear power needs to be done.

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APPENDIX

The outline of the major questions used in the interview guide follows. The actual guide also included one or more probes after most questions. Further details can be obtained by contacting the author.

1. Safety review structure. The standard technical specifications say that the methods of independent review and audit may take many forms: the license may utilize a standing committee or it may assign the function to a separate organizational unit. At your plant, the decision has been made (a) to utilize standing committees, or (b) to assign the function to a separate unit.

a. Rationale. Why was this method of review chosen?

b. Advantages and disadvantages. In your opinion, what are the advantages and disadvantages of this method?

2. Plant review group. Let's turn to the plant safety review group. Can you tell us a little about its history?

a. Rationale. Why was it formed?

b. Mission. What is its mission? Is it achieving its mission?

c. Composition. What is its composition? How are individuals selected?

d. Major tasks. What are the major tasks it carries out? What other tasks should it undertake?

e. Process. Describe how the safety review group performs its task.

f. Output. What are the products of the committee's work? List items like reviews, reports, rules, and meeting minutes that the committee issues. (Try to obtain selected copies of these items.)

g. Workflow relations. Who does the committee report to, that is, to whom does it submit its output? Who else should receive its output?

h. Impact of plant safety. Assess the impact of the group on plant safety. Describe its impact.

i. Possible changes. What are the most important changes in mission, composition, tasks, procedures, or powers that would improve the performance of the committee? Discuss.

3. Utility review group. Let's turn to the utility review group. Can you tell us a little about its history?

a. Rationale. Why was it formed?

b. Mission. What is its mission? Is it achieving its mission?

c. Composition. What is its composition? How are individuals selected?

d. Major tasks. What are the major tasks it carries out? What other tasks should it undertake?

e. Process. Describe how the utility review group performs its tasks.

4. ISEG. (This section only applied if a plant had an independent safety engineering group or the equivalent.) Let's discuss ISEG (or the ISEG-equivalent). Can you tell us a little about its history? Has it performed useful functions?

a. Rationale. Why was it formed?

b. Mission. What is its mission? Is it achieving its mission?

c. Composition. What is its composition? How are individuals selected?

d. Major tasks. What are the major tasks it carries out? What other tasks should it undertake?

e. Process. Describe how ISEG performs its tasks.

f. Output. What are the products of ISEG's work? List items like reviews, reports, rules and meeting minutes that ISEG issues. (Try to obtain selected copies of these items.)

g. Workflow relations. Who does ISEG report to, that is, to whom does it submit its output? Who else should receive its output?

h. Impact on plant safety. Assess the impact of ISEG on plant safety. Describe its impact.

i. Possible changes. What are the most important changes in mission, composition, task, procedures, or powers that would improve the performance of ISEG? Discuss.

5. Possible ISEG. (This section only applied if a plant did not have to have an independent safety group or the equivalent.) Discuss the possible functions that could be performed by an ISEG. Would an ISEG perform useful functions?

a. Formation. How would an ISEG be formed?
b. Mission. What would be its mission?
c. Composition. How would it be composed?
d. Major tasks. What major tasks would it perform? What other tasks should it undertake?
e. Agenda. How would issues get on its agenda?
f. Analysis. What kind of analysis would it do?
g. Powers. What powers would it have?
h. Output. What would be its outputs?
i. Workflow relations. To whom would it report?
j. Impact on plant safety. What impact would it have on plant safety?
k. Impact on current practices. How would it affect current safety review practices?

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RELATION OF DOMINANT PROBLEMS TO STAGES OF GROWTH IN TECHNOLOGY-BASED NEW VENTURES

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Two studies investigating the growth patterns of new ventures are presented. In the first study, a stage-of-growth model theorized to apply specifically to technology-based new ventures was developed from two cases. Stages are described as a configuration of organizational design variables representing a firm's response to the sets of dominant problems it faces at sequential times. The second study explored relationships between stages of growth and a theorized pattern of dominant problems using a data base of 105 firms. Partial support emerged for the link between dominant problems and stages of growth.

Technology-based new ventures play an increasingly important role in the development and commercialization of new products, processes, and technologies. In fact, such organizations have been instrumental in the creation of entire industries such as personal computers, genetic engineering, machine vision, and robotics. The popular press has given considerable attention to the growth-related strategic and managerial problems of such firms. Articles about the computer industry alone have addressed internal organizational problems and transitions (Uttal, 1985), loss of market share attributed to a hesitancy to embrace new technologies (Wiegner, 1986), and a lack of focus on manufacturing efficiency (Wiegner, 1986).

However, little is known about how the models of organizational growth and development found in the management literature and typically theorized to hold for all organizations apply to technology-based new ventures. A better understanding of the growth patterns of such firms will sharpen the descriptive power of management theories and ultimately advance our ability to influence organizational performance.

REVIEW OF THE LITERATURE

Traditionally, scholars have used a biological analog to explain the growth patterns of organizations. The most recent examples are life-cycle perspectives on individual organizations (Kimberly & Miles, 1980) and on groups of organizations (Hannan & Freeman, 1984; McKelvey & Aldrich, 1983).

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A number of multistage models have been proposed in which predictable patterns in the growth of organizations are assumed to exist and to unfold as discrete time periods best thought of as stages (Scott, 1970; Smith, Mitchell, & Summer, 1985). Examples range from three-stage models (Blake, Avis, & Mouton, 1966; Cooper, 1979; Smith et al., 1985) and four-stage models (Hosmer, Cooper, & Vesper, 1977; Rhenman, 1973), to models of five or more stages (Adizes, 1979; Miller & Friesen, 1984; Van de Ven, Hudson, & Schroeder, 1984). Reviewing much of this literature, Quinn and Cameron (1983) integrated nine separate models into a summary model with four major stages. A major strength of the literature on life-stage models is that it adds to our understanding of the rather complex phenomenon of growth, describing how growth happens and the effect that it has on organizations.

As it presently stands, however, work on growth has several shortcomings. All stage-of-growth models can be seen as what Starbuck (1971) termed metamorphosis models, in that they describe problems organizations in differing circumstances are likely to encounter and the corresponding organizational forms likely to result. As its problems change, an organization must alter its form accordingly. For example, Greiner (1972) explicitly viewed the growth of organizations as a series of evolutions and revolutions precipitated by crises related to leadership, control, and coordination. Alternatively, Chandler (1962) viewed stages of growth as responses to a firm's search for new growth opportunities. In other metamorphosis models, an underlying theory is implicit, but many such models lack theoretical explicitness and rigor and offer little explanation of why the characteristics of a particular stage of growth emerge. The determinants of a firm's position in a particular stage of growth and the factors that precipitate a shift from one stage to another are at best implied. This deficiency limits the ability of researchers to conduct empirical tests and to explore the constructs further.

Second, as Kimberly noted, "there is no inevitable linear sequence of stages in organizational life, although there may be remarkable similarities among the developmental patterns of certain clusters of organizations" (1980: 7). Yet most models do not take into account the role of industry, technology, and other situational variables. Their proponents seem to have postulated them as applying to all organizations, regardless of context.

Finally, the work related to stage of growth has been overwhelmingly conceptual and subject to challenge. For example, some scholars have seen the concept of an organization developing through a series of predictable stages as an overly simplistic view (Tornatsky et al., 1983). Miller (1981) found that firms do not necessarily demonstrate an inexorable movement through a linear sequence of stages but rather attain gestalts or patterns of strategy, structure, and environment that may emerge for any number of reasons. Romanelli and Tushman (1986) argued that firms evolve through periods of convergence and divergence related more to technological shifts in their industry than to issues of growth. Further, several authors have proposed typologies that categorize organizations into a number of profiles but suggest no developmental sequence among types (Gartner, 1985; Hosmer et al., 1977).

The literature on stages of growth has little empirical basis for countering such criticisms. The empirical work that has emerged in recent years (Miller & Friesen, 1984; Smith et al., 1985; Van de Ven et al., 1984) has focused primarily on differences in internal organizational characteristics across theorized stages. However, the researchers seem to have assumed a priori the existence of stages.

To investigate the growth and developmental patterns of technology-based new ventures, I employed a multimethod research design intended to address several criticisms of the literature on stages of growth.

STUDY ONE: DEVELOPING A GROUNDED BASE FOR THEORY BUILDING

My initial step in studying the growth patterns of technology-based new ventures was undertaking two case studies. In general, the theory-building process associated with this research can most accurately be described as inductive; it was similar in some respects to what Glaser and Strauss (1967) termed grounded theorizing.

Methods

Both of the firms studied were manufacturers of computer-based office products. After initial contact with the firms through a consultant, I defined a research project to describe the growth experiences of each firm. One firm was in a small town in rural eastern Pennsylvania. The other had operations in central Florida. I collected all data. The case studies cover the histories of the ventures from their creations through August 1979, when the interviews were conducted. Considerable time was spent at each company in interviews with the chief executive, all managers who reported directly to him, and the heads of each function and selected subunits. People who were early employees of the firms and were still with them were also interviewed. To provide balance, I also interviewed several employees of less than three months and some individuals who had recently left the companies. In all, over 60 managers and employees were interviewed at the two ventures. To fully capture the richness of the data and to avoid biasing the findings toward one theoretical construct or another, interviews were unstructured and open ended. Inquiries centered around decisions, actions, problems, and patterns of growth since the inception of the firms. Particular attention was paid to how and why each organization took the form that it did over time.

Detailed notes were kept from each interview and were regularly reviewed before later interviews to validate assertions across interviewees. I gathered additional data from an archival review of documents like business plans, organization charts, employee rosters, and internal memoranda. I then integrated the interview notes and other data into histories, each approximately 50 typed pages in length. Each firm's CEO reviewed its history for accuracy. Interpretative disagreements between the CEOs, the other managers, and me did emerge and were noted. In such instances I put both interpretations in the case study. Burgelman (1983) and Dean (1987) used a similar method of data collection.

The following synopses of the cases provide some flavor of the firms' experiences. The names of the organizations and of individuals have been disguised at the request of the participating firms.

Alpha

The origins of Alpha are traced to 1974 and to Tom Riley, the founder and driving force of the firm. Working with semiconductor technology, he developed what became one of the first commercial electronics-based office products in a market then relying on mechanical technologies.

By early 1976, the firm was primarily concerned with developing and refining the product idea. In August, the firm had grown to 40 employees and had completed a prototype of the product. It began manufacturing and marketing efforts. At this point, little structure or formality existed and planning was limited to budgeting and financial forecasting.

Most of 1977 was dedicated to preparation for launching the product, which entailed finalizing the marketing strategy and building a sales and support organization. The firm announced and offered the product in January 1978, by which time it had about 500 employees. Initial demand exceeded projections, and growth in both revenues and the number of employees picked up markedly.

From January 1978 to April 1979, the number of employees increased from approximately 500 to 1,000. The firm hired many of those individuals in response to specific pressures and needs in functional areas. Each function faced a series of problems related to its specific tasks, which served as a precipitating factor for the introduction of greater structure and rationality, typically in the form of increased specialization or the addition of new integrating and planning processes. At the end of this research, Alpha had about 1,400 employees, three products, and five plants, all in the eastern United States.

Beta

The genesis of the firm's low-cost fiber-optics-based product can be traced to John Thomas, developer of the product and first president of Beta. Starting in 1969 with a series of small seed grants, the evolution of the product from initial conception to the first contracted development work took approximately two years and represented a transition from very informal product experimentation to the beginnings of the organization. In 1971, Thomas developed a working prototype of the product on his own. Shortly thereafter, after several rejected proposals, he gained financial backing, dedicated himself full-time to the firm, and hired several engineers. During the prolonged start-up period, requiring several funding proposals, consultants handled the marketing, financial, and administrative functions on a contractual basis.

The product was announced and offered for sale in late 1973, and by May 1974 demand exceeded manufacturing capacity. This was a period of rather intense growth in which the firm experienced some highly focused internal organizational problems. During this time many new positions were created and filled.

In June 1977 a new president was brought on board as a result of pressures from investors concerning performance, and Thomas was appointed chairman of the board. A gradual transfer of authority and responsibility transpired over the next six months. By January 1978 the new president had completed some consolidation, mostly within the marketing function, and had created new functions in planning, international sales, and marketing through outside appointments. At the end of this research, Beta had over 1,000 employees.

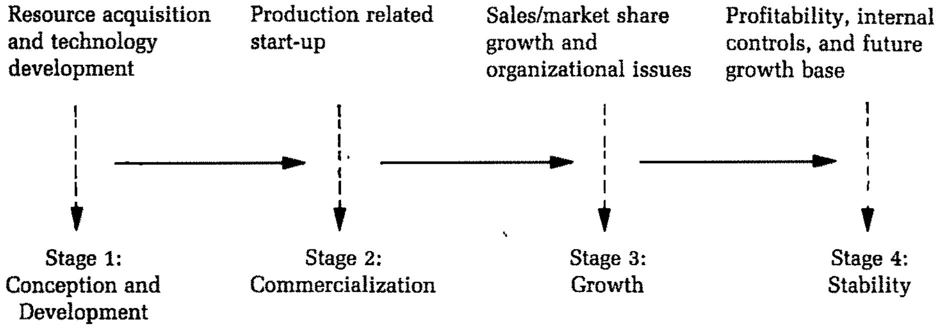
A Stage-of-Growth Model

The growth histories of Alpha and Beta strongly suggest a stage developmental pattern. Managers at both firms described their experiences and the history of their growth in terms of stages without my referring to the construct. Much of the discussion of stages, however, emphasized the role played by problems the firms faced.

The managers of these technology-based new ventures faced strategic and operational problems from the time of product conceptualization through organizational maturity. Further, some of those problems seem to have been more dominant than others at times, and a sequential pattern of dominance seemed to exist. The particular problems faced at a given time appeared to be strongly associated with a venture's position in a particular stage of growth (Block & MacMillan, 1985; Galbraith, 1982). As the dominant problems change, an organization's configuration of organizational design variables changes in response. Figure 1 shows the proposed associations. Although previous research (Miller & Friesen, 1984; Rhenman, 1973) and the grounded case examples (Kimberly, 1979) generally support the model, it is not proposed as universally generalizable. Both Penrose (1952) and Rhenman (1973) argued that there is no life cycle or phased sequence applicable to all organizations and that the recurrent cycles and patterns in organizations that can be observed are a product of specific environments. Influential environmental factors include technological discontinuities that introduce radically new technologies to existing industries (Tushman & Anderson, 1986), the emergence of new industries, and shifts in demand patterns.

This research should be seen as generating a midrange theory (Pinder & Moore, 1979) of growth, applicable only to certain organizations. Specifically, the assumptions of this model are: (1) it holds only for technology-based new ventures, (2) it explains only internally generated growth, not growth by acquisition or merger, (3) for its focal population of firms, a market segment or niche exists such that demand conditions are not limiting, and (4) the

FIGURE 1
Relation of Dominant Problems to Stages of Growth


Resource acquisition and technology development
Production related start-up
Sales/market share growth and organizational issues
Profitability, internal controls, and future growth base
Stage 1: Conception and Development
Stage 2: Commercialization
Stage 3: Growth
Stage 4: Stability

population's focus is on initial growth within a single product-technology base.

The third assumption is not unreasonable for firms in an emerging industry experiencing extraordinary growth. Firms in some computer components markets and those in the personal computer, genetic engineering, and robotics and related markets have seen times when demand was not a limiting factor. New firms in such environments attempt to increase their customer base with the growth of the market. Additionally, the short and overlapping product life cycles characteristic of such technology-intense industries tend to fuel growth further, because products frequently become obsolete.

Although consistent with several models found elsewhere in the literature (Blake et al., 1966; Galbraith, 1982; Normann, 1977; Rhenman, 1973; Quinn & Cameron, 1983), this model, grounded in the experiences of two firms, differs in that it explicitly describes stages as linked to dominant problems. The four-stage model, presented with additional supporting case data is as follows.

Stage 1: Conception and development. Before their formal creation, as signified by incorporation or by gaining a major source of financial backing that goes beyond initial seed grants, virtually all ventures go through a period during which the primary focus of the entrepreneur and possibly of several others is on the invention and development of a product or a technology. In 1974, Riley, the founder of Alpha, developed the idea of an electronic typewriter with memory while working with semiconductor technology. Initial attempts to gain financial backing were rejected because he lacked proprietary technology. Continued proposals to several potential backers resulted in an initial seed grant. At Beta, Thomas traced his interest and work on the product that ultimately launched the venture back to 1965. He worked on the project on his own time until late 1971, when he developed a workable prototype design. After several attempts, he finally convinced a backer of the strength of his idea. It was not until July 1972 that Beta was incorporated, with Thomas as the first employee. Such activities are associated with the creation of the idea for a new business (Normann, 1977; Sarason, 1972; Van de Ven et al., 1984).

Structure and formality are nonexistent during this stage, with almost all activity focused on technical issues as defined and directed by the founding entrepreneur(s). With Alpha's initial venture capital, Riley proceeded to overcome several key technical hurdles, build prototypes, and hire engineering support. During the early days of the firm, activities were implicitly and informally organized around project management principles, with all employees working in one room.

Major problems of organizations at this point include construction of a product prototype (Block & MacMillan, 1985) and selling the product and business idea to financial backers (Timmons, Smollen, & Dingee, 1977). Working prototypes were developed by early 1972 at Beta, leading to the acquisition of additional, more significant funding and a movement toward commercialization. The major milestones associated with the technical development were initial development, building a so-called proof-of-principle machine, testing and debugging, constructing 2 prototypes, and constructing 10 to 20 prototypes for test and evaluation. Alpha made several unique technological advances over a six-month period, using several engineers who were hired on a short-term contract with a promise of a position if feasibility could be established. It was not until February 1976 that Alpha became an incorporated entity with full-time employees other than the founder.

Stage 2: Commercialization. Given financial backing, new ventures go through a period during which their major focus is on developing the product or technology for commercialization. At this point, the organization largely resembles a new product-development team, with its problems and competences largely being technical. The focus is primarily on learning how to make the product work well and on how to produce it beyond the model shop prototype approach of the first stage (Galbraith, 1982). At Alpha, about two years passed between incorporation with full-time employees to the company's public announcement of its first product, in early 1978. In May 1976, the firm hired a director of manufacturing to plan manufacturing facilities and to begin to identify suppliers. At the time of product launch, all employees still worked in one room with desks lined up against each other and eight telephone lines for all 175 people. Under such an arrangement communication was face-to-face, and employees were either directly involved with or witnessed all decisions.

In this stage, building an organizational task system becomes a consideration. By this time, discrete organizational functions like manufacturing and engineering have been formally created, and others are embryonic. At Alpha in early 1977, the primary focus was preparing to launch the product. The start of the marketing function began early in the year with the hiring of individuals to work on software specifications and design. By midyear the marketing field organization began to evolve with the hiring of field managers, salespeople, new trainers, and technical support people. The financial and administrative systems also emerged at this time with the appointment in April of a full-time director of finance to replace an outside consultant who had set up the systems used to that point. Shortly thereafter, a full time bookkeeper was hired as well.

Some critical functions may be assigned to part-time employees or contracted out. During this time at Beta, one consultant conducted market research, and another structured basic administrative systems. The two consultants later joined the firm as full-time employees.

In this period, a single owner or a small number of partners will dominate the venture. Toward the end of this stage, the venture's product is publicly announced or made available for sale.

Stage 3: Growth. If a product is technically feasible and achieves market acceptance, a period of high growth will typically result. The major problems of a new venture at this point are to produce, sell, and distribute its product in volume and to avoid being shaken out of the market as ineffective or inefficient (Abernathy & Utterback, 1982; Moore & Tushman, 1982). Under pressure to attain profitability, a venture must carefully balance profits against future growth.

Many ventures experience a sequence of functionally localized problems as each function faces the difficulty of building an efficient and effective task system. At Alpha, from mid-1977 to late 1979 could be considered a transition period characterized by a series of organizational problems with a clear dominant focus. The first of those was an engineering crisis from mid-1977 to early 1978. The difficulty was to get the product to work reliably and to function as promised. The second crisis, following shortly thereafter in the second half of 1978, was in manufacturing. The problem was to overcome "manufacturing constipation"—to get more machines off the end of the line. A third crisis emerged in early 1979 within the marketing function. The problem was an inadequate selling capacity that constrained the selling of more machines. At the time of this research, several sources suggested the emergence of problems in the areas of product reliability, service within marketing, and financial controls. Most of the crises, and certainly those in manufacturing and marketing, were overcome by expanding numbers and types of employees and by creating and formalizing new positions and systems. Many interviewees thought, however, that the financial crisis required an emphasis not on the size of the personnel, but on the nature and quality of information and internal decision processes.

At Beta, a series of problems also characterized the transition from an early start-up organization to a high-growth, high-volume company. The first two came close together. By early 1977, it became apparent that Beta was not meeting its sales goals. The marketing crisis resulted in the firm's hiring a person with an extensive marketing background to serve as a general manager under Thomas, who continued as chairman of the firm. Also recognized at about the same time was a financial and administrative crisis centering on the gross inadequacy of the company's billing procedures and inventory controls. The firm did not focus on those problems until 1979 because the marketing problems were more pressing, but it devoted much of 1979 to financial and accounting systems and controls, management information systems, and planning and budgeting.

In stage 3, a new venture experiences an almost constant state of change. The original general manager may remain central to all decision making, but through this stage there is a growth of hierarchy, an advent of functional specialization, and a move toward adding professionally trained, experienced people.

In January 1978 Alpha announced and offered its first product. With commercialization and strong product demand, the number of employees increased dramatically. Although some staff was in place for each function, it was becoming necessary to flesh out the functional organizations as Alpha built depth in engineering, brought additional plant capacity on line, positioned a national field sales force, and structured administrative systems and support capabilities. With the increase in personnel, it was necessary to establish more formalized structures and reporting mechanisms. Everyone no longer knew everyone else by name, and not everyone could report directly to Riley, as had been the case. Therefore, the first formalization of structure was instituted with a functional organization design.

As at Alpha, at Beta most organizational structure and internal system developments were initiated at the functional level. Here again, each function changed from an informal, nonspecialized activity to a structured, specialized, and formalized organization, typically as a result of the precipitating problems discussed in this section.

Stage 4: Stability. As the growth rate slows to a level consistent with market growth, a venture enters a new stage. Its major problems at this point are to maintain growth momentum and market position (Moore & Tushman, 1982). The typical focus becomes the development of a second-generation product. A professional, experienced manager or team of managers may have replaced or may be supporting the original owner (Gupta, 1984; Kerr, 1982). In January 1978 the general manager became the president of Beta. Shortly after assuming his new duties, he uncovered what might be described as another crisis—an "engineering and product planning void." The main problem was that no one at Beta was concerned about new products or even subsequent generations of existing products. His initial actions included a comprehensive reorganization of the marketing and engineering areas.

By this time, a venture has evolved from an organic technology-product development group into a stable, functional, operating company characterized by bureaucratic principles across the organization. It has and adheres to a formal structure and has correspondingly standardized and formalized rules and procedures. During 1978 at Beta, deepening and strengthening functional marketing and R&D capability through an influx of new talent were focal. In engineering, a new director who instituted formal project-planning activity and project management systems was hired. Developing second- and third-generation products had high priority, an emphasis initiated with the creation of an advanced product-planning group within R&D, headed by a director, also newly hired from outside. By this time, Beta had over 1,000 employees, many of whom were highly specialized.

By April 1979, the number of employees at Alpha exceeded 1,000. With this growth came a need to modify the structure specifically to reduce Riley's span of control. With even greater growth at an increasing rate projected for the next year, it was no longer possible to have over ten individuals reporting directly to the chief executive. Therefore, Riley consolidated his organization under vice-presidents for marketing, operations, administration, and international sales.

STUDY TWO: THE RELATION OF DOMINANT PROBLEMS TO STAGES OF GROWTH

Review of the Literature

The literature on stages of growth typically implies that problems influence internal organization. However, the findings from the field study suggested that problems played a central role in the growth patterns of new ventures and so deserved additional theoretical development. Several studies have discussed the role of dominant problems as contextual factors. The literature on product life cycles (Midgley, 1981; Moore & Tushman, 1982; Porter, 1980) has long proposed that there is a pattern of primary tasks or concerns that firms face for each theorized stage. They may be either functional tasks or strategic positioning issues. This idea is relevant because technology-based new ventures typically experience their initial growth around a single new product.

The work of Miles and Snow (1978) also offers support. Although not focused directly on small, emerging firms, they outlined a pattern of growth for mature firms facing a change of domain. Their adaptive cycle outlines "the three major problems which management must continually solve: entrepreneurial, engineering, and administrative" (1978: 21). The entrepreneurial problem concerns redefinition of a firm's domain by the modification of products or market offerings. The engineering problem focuses on the creation of a systems delivery capability for changes. Finally, the administrative problem requires rationalizing and stabilizing solutions instituted in earlier stages.

More recently, Block and MacMillan (1985) discussed the role of problems with a specific reference to new ventures. They listed ten milestones that a new venture must pass as it evolves from an idea to a viable business entity. Milestones include such tasks as the completion of concept- and product-testing, completion of the prototype, production start-up, and first redesign and redirection. Galbraith (1982) offered a stage-of-growth model similar to the present model and consistent with Block and MacMillan's (1985) research, in which certain tasks (problems) are associated with each stage of growth. Storey (1985), in the only empirical study of the problems of new ventures found in the literature, investigated problems facing new firms in the United Kingdom. He found that the problems differed by industry as well as by the age of firms.

Propositions

If empirically supportable, the four stages of growth would constitute distinct contexts for managerial focus and decision making. My empirical research assessed the validity of the stage-of-growth model by investigating the relation of dominant problems to stage. A strong association between the problems a firm faces and its stage of growth would support the model presented, providing a better understanding of how and why stages emerge. Therefore, I expected four primary patterns of association and investigated them with a large number of firms.

> *Proposition 1: Stage 1 firms will rate problems associated with resource acquisition and technology development higher than will firms in other stages.*
>
> *Proposition 2: Stage 2 firms will rate problems associated with production start-up, vendor relations, facilities, and field support of the product higher than will firms in other stages.*
>
> *Proposition 3: Stage 3 firms will rate problems associated with sales growth, market share growth, and internal organizational mechanisms higher than will firms in other stages.*
>
> *Proposition 4: Stage 4 firms will rate problems associated with profitability, internal controls, and future sources of growth higher than will firms in other stages.*

Methods

Four venture capitalists provided a portfolio of firms from which to select and provided entrée to firms that otherwise might not have responded. Data were collected in late 1982 through a questionnaire. The venture capitalists provided names and addresses of the firms and a cover letter to the potential respondents supporting the research project. To be included, a venture had to have been created since 1970, be in a business considered high technology, such as computers and related electronics products, and be autonomous and free-standing. No intracorporate start-ups or joint ventures were included. Of the 225 firms contacted, 105 (46%) responded. The chief executive officer served as the respondent in each firm.[1]

Measurements. Each problem was measured by asking a venture's CEO to rate problems on a 1 to 7 scale in terms of their current dominance to the firm. The Appendix lists the dominant problems.

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[1] For a discussion of the advantages and disadvantages of using self-categorization measures with CEOs as respondents, see Hambrick (1980).

The measure of stage of growth was a self-categorization. CEOs were asked to select the one of four unlabeled descriptions of a firm and its situation that most closely described their own firm.[2] The descriptions corresponded to the stages of growth outlined in the present model. The Appendix gives the four descriptions. The stage measure preceded the problem measure in the questionnaire.

The construct validity of the self-categorization measure was assessed through investigating the relationship of stage with salient external variables. I collected data on the age of firms (years), their size (total number of employees), and their rate of growth (a factor of actual sales for the previous year). Table 1 presents the means for each variable within each stage. As expected, the means for age and size increase with each subsequent stage, suggesting a movement of firms through stages. Also as expected, growth increased from stage 1 through 3, with stage 3 showing the highest rate of growth, and then decreased. These findings offer support for the validity of the stage model. Like data from a cohort analysis, such cross-sectional data are an imperfect substitute for longitudinal data but do suggest the order in which firms move from stage to stage.

Analysis and Results

Initially, I performed a multivariate analysis of variance (MANOVA) grouping firms on the stage variable to see if significant differences existed on the ratings of the 18 problems. The analysis resulted in an overall significant finding ($F_{54,248} = 1.59$, $p < .01$), suggesting that there are significant

TABLE 1
Results of ANOVA for External Variables and Stages[a]

Variables[b]	Stage 1: Conception and Development	Stage 2: Commercialization	Stage 3: Growth	Stage 4: Stability	F	ω^2
Size	58.1	68.1	345.6	423.4	116.69*	.06
Age of firm	4.3	5.6	7.1	9.4	17.41*	.24
Rate of sales growth	3.7	4.2	6.4	1.8	10.53*	.005

[a] For stages 1–4, N = 23, 26, 18, and 37, respectively.

[b] Size = number of employees; age was in years; growth = current year's sales/previous year's sales.

* $p < .001$

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[2] For a discussion of the advantages and disadvantages of the use of self-categorization measures by chief executives, see Snow and Hambrick (1980).

differences in problem ratings across stages. I then performed a factor analysis to better reveal the factorial structure among the 18 problems rated.[3]

Principal components analysis with varimax rotation was chosen because it requires no prior assumptions about the structure of data and is widely accepted as an appropriate procedure for identifying meaningful dimensions in a multivariate domain (Cooley & Lohnes, 1971). Six interpretable factors, presented in Table 2, resulted.

The factor loadings suggest a grouping of problems consistent with the model. The first factor, which loads heavily with problems related to internal administrative systems and concerns—management information systems, cost control, financial information systems, and the general level of red tape—is an organizational-administrative construct. Factor 2, which includes such concerns as meeting sales targets, attaining profit and market-share goals, penetrating new geographic markets, and maintaining the quality of product support and customer service, is related to critical requirements for success in the marketplace and can be interpreted as a sales and marketing factor. Only two variables, attracting capable employees and management depth and talent, load on factor 3, which can be termed a people construct. Factor 4, which also includes only two variables, the ability to produce in volumes adequate to meet demand and the development of a network of reliable vendors and suppliers, is a production construct. Factor 5 includes a firm's position in a new product-market segment and the development of a new product or technology application and is therefore a strategic positioning factor. Finally, the two problems that loaded on the last factor were securing financial resources and backing and acquiring key outside advisers or board members, which makes this an external relations factor.

After factor analysis, an alpha coefficient was calculated for the items defining each factor. Coefficients ranged from .51 to .79, reinforcing the reliability of the constructs (Nunnally, 1970). I then calculated scale scores using a unit weighting of the means of the associated problem ratings. To investigate the relationship of the factors and stages, I then conducted a one-way ANOVA with each of the factor variables against stage. Table 3 presents the results, which are significant for four of the six factors.

To facilitate examination and interpretation of the problem factors' means across and within stages, the results shown in Table 3 have been plotted in Figure 2. It is interesting that several of the problem factors—strategic positioning, sales-marketing, and people—are more dominant than the other factors in all stages.

Post hoc comparisons based on a Scheffé test were conducted for the four factors with significant mean differences (Table 3). I compared factor ratings for firms in specific stages with those of firms in other stages to test for the hypothesized differences. The organizational factor demonstrated

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[3] Both Kim and Mueller (1985: 76) and Lawley and Maxwell (1971: 20) suggested that an adequate sample size exists for factor analysis if $n-p-1 > 50$, where n = the number of observations and p = the number of variables. In this case, $n-p-1 = 85$, suggesting an adequate size.

TABLE 2
Results of Rotated Principal Components Factor Analysis[a]

Dominant Problems	Factor 1: Organizational Systems	Factor 2: Sales/ Marketing	Factor 3: People	Factor 4: Production	Factor 5: Strategic Positioning	Factor 6: External Relations
Develop management information systems	.78	.00	.00	.00	.00	.00
Control costs	.74	.00	.00	.00	.00	.00
Define organizational roles, responsibilities, policies	.69	.00	.29	.00	.00	.00
Develop financial systems and internal controls	.69	.00	.00	.28	.00	.00
Cut administrative burden and red tape	.60	.00	.26	.00	.28	.00
Meet sales target	.00	.82	.00	.00	.00	.00
Attain profit and market-share goals	.37	.75	.00	.00	.00	.00
Penetrate new geographic territories	.00	.74	.00	.00	.00	.00
Provide product support and customer service	.00	.56	.00	.50	.00	.00
Attract capable personnel	.00	.00	.81	.26	.00	.00
Achieve management depth and find talent	.39	.00	.69	.00	.00	.00
Produce in volumes that meet demand	.34	.00	.00	.76	.00	.00
Develop network of reliable vendors and suppliers	.00	.00	.31	.75	.00	.00
Establish firm position in new product market segments	.00	.26	.00	.00	.78	.00

TABLE 2 (continued)

Dominant Problems	Factor 1: Organizational Systems	Factor 2: Sales/ Marketing	Factor 3: People	Factor 4: Production	Factor 5: Strategic Positioning	Factor 6: External Relations
Develop new product or technology application	.00	.00	.00	.00	.75	.00
Secure financial resources and backing	.00	.00	.00	.00	.00	.84
Acquire key outside advisers, board members	.00	.00	.00	.00	.00	.77
Eigenvalue	3.02	2.61	1.73	1.71	1.59	1.46

[a] The matrix has been rearranged so that the columns appear in decreasing order of variance explained by factors. The rows have been rearranged so that for each successive factor, loadings greater than .50 appear first. The computer program employed replaced loadings lower than .25 with .00. The program dropped the problem adequate facilities or space as it showed no factor loadings above .25.

TABLE 3
Results of ANOVA for Factors and Stages[a,b]

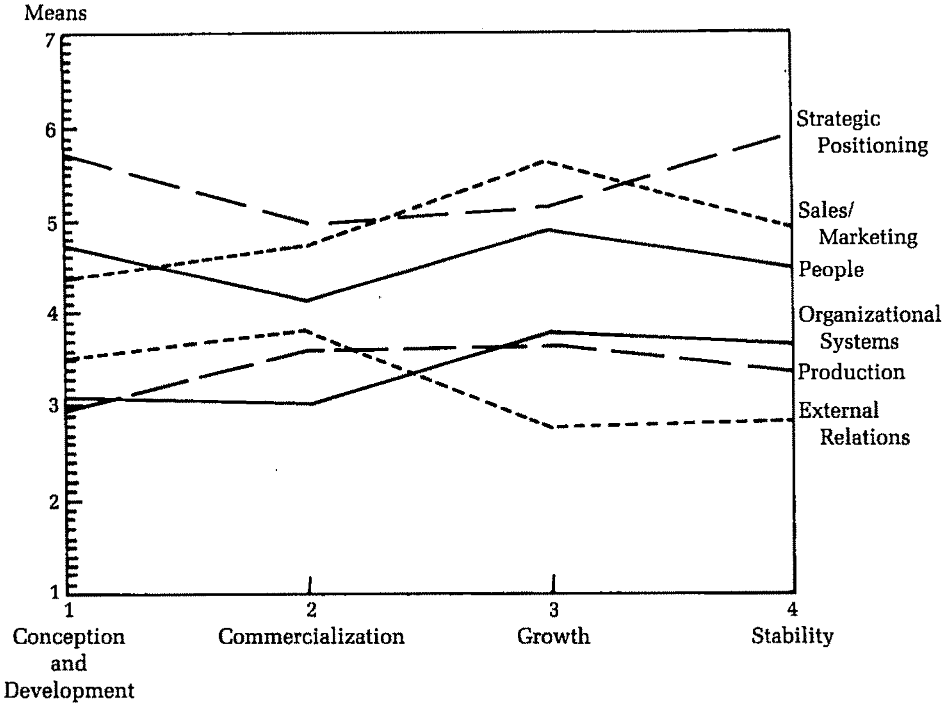
Factors	Stage 1: Conception and Development	Stage 2: Commercialization	Stage 3: Growth	Stage 4: Stability	F	ω^2
1. Organizational systems	3.0696††	3.0154††	3.7556†	3.6324†	2.9878*	.05
2. Sales/marketing	4.3696††	4.7212††	5.5972†	4.8784††	3.3778*	.08
3. People	4.7174	4.1346	4.8611	4.4459	1.4000	.01
4. Production	2.9567	3.6026	3.6296	3.3153	1.3117	.01
5. Strategic positioning	5.7174†	4.9615††	5.1389††	5.8784†	3.2730*	.06
6. External relations	3.5217††	3.7885††	2.7500†	2.8108†	2.7775*	.05

[a] For stages 1–4, $N = 23, 26, 18$, and 37, respectively.

[b] Superscripts show the results of post-hoc comparisons based on a Scheffé test. For each factor with an overall significant ANOVA, a † indicates a mean significantly greater than a mean with a †† ($p < .01$).

* $p < .05$

FIGURE 2
Plot of Means of Dominant Problem Factors Across Stages of Growth



Stage of Growth

significantly higher means for firms in stages 3 and 4 than for firms in stages 1 and 2. The sales-marketing factor showed significance with stage as well, with stage 3 firms clearly rating these problems as more dominant than did firms in other stages. The strategic positioning factor was rated higher by stage 1 and stage 4 firms than by firms in stages 2 and 3. The final significant result was for the external relationship factor, which was rated more dominant by stage 1 and stage 2 firms than by stage 3 and stage 4 firms.

Omega-squared values were also calculated (Tables 1 and 3). The omega-squared coefficient, which is analagous to R^2, can be used as a goodness-of-fit measure as it provides an estimate of a treatment's effects on the variation of the response variable (Green, 1978). In the tables, these values are equivalent to R values of .07–.48.

DISCUSSION AND INTEGRATION

It would seem that dominant problems, the increase or decrease of their influence, and the relations among them might in themselves be valuable constructs deserving of additional study. The findings of this research serve as a useful starting point in this regard.

The theoretical role of dominant problems is important, not only in defining and measuring discrete stages, but also in understanding the transition from stage to stage, which I viewed as an organizational learning process (Normann, 1977; Rhenman, 1973). Miles noted that "organizational learning occurs in response to immediate problems, imbalances or difficulties, in what Downs (1967) has referred to as performance gaps . . . . The intra-organizational conflicts and tensions created by these immediate problems serve a constructive function in stimulating search behaviors that lead to organizational learning" (1982: 157–158).

The particular problems it faces at a given time define a venture's position in a particular stage of growth. The venture will then undergo some search for knowledge and competence and, if successful, will resolve those problems. The problem-search-resolution process will recur in subsequent growth cycles, since the venture will again face the same problems (Miles & Snow, 1978).

This process will constitute organizational learning if a new venture can map solutions onto its organization in terms of specific functions, structures, and positions, as well as information, decision, and planning processes. Solutions to problems should not be tied to specific individuals because they would then have to be reinvented in the absence of those people (Jelinek, 1979). In other words, if learning occurs, an organization institutionalizes the solutions to these recurring problems so that it can replicate those solutions when they are needed.

Such an organizational learning cycle explains how a successful new venture makes the transition from one stage of growth to the next and suggests why some fail. If Alpha had not gained initial funding or demonstrated its product's technical feasibility, it would not have become a stage 2 firm concerned with developing the capacity to launch the product. Had Beta not resolved its financial and administrative control problems, it might not have continued to grow and might not have made the transition to stage 4 and the concerns of new product development and long-term viability.

Thus, the transition from stage to stage is effected in two ways. First, structures and processes that were not previously required are institutionalized. Second, elements of the organization may be radically altered; for example, types of employees or reward systems may change.

The findings from studying 105 technology-based new ventures offer some support for a link between dominant problems and stages of growth. The predicted dominant problems for stage 1 firms were product or technology development and resource acquisition, and firms in this stage rated the development of new product or technology applications higher than other problems. The problem is apparently a prime concern of both stage 1 firms attempting to establish their initial product and stage 4 firms looking to develop second-generation or completely new products to spur further growth. Since firms move from initial development through subsequent growth or adaptive cycles (Miles & Snow, 1978), such a U-shaped relationship should be expected to emerge. The problem of securing financial resources and backing demonstrated significantly higher mean ratings for stage 1 and 2 firms than for stage 3 and 4 firms.

Little support emerged for a link between the hypothesized dominant problems and stage 2. Production-related problems demonstrated no significant differences across stage. Interestingly, firms in this stage rated acquisition of resources highest. Additionally, sales and marketing problems were rated noticeably higher in stage 2 than in stage 1.

Results for stage 3 firms strongly supported the model. Sales and marketing were significantly more important to firms in this stage than to firms in other stages. Also, organization was significantly more important for stage 3 and 4 firms than for firms in stages 1 and 2.

Finally, only moderate support emerged for the relationships theorized for stage 4. Strategic positioning was important for stage 1 and 4 firms, and organization and administration were also a problem for stage 4 as well as stage 3 firms, consistent with a need for increased control in a large organization.

Examining the plots of dominant problem factors across stages (Figure 2) yields further insights. The strategic positioning factor ranks first in three stages and second in one stage. The people factor ranks second or third in all four stages. It seems that technology is a continual focus for any technology-based firm. Also, since technology is embodied in the skill sets of individuals, people are also of regular concern. Managerial depth is typically a concern when firms are growing rapidly, as were most of the firms studied, regardless of stage. Finally, the sales-marketing factor ranks first or second in three stages and third in one, which may also be a function of the high rates of growth attained and expected by these ventures.

CONCLUSIONS

Several conclusions concerning the model can be drawn. Support for the hypothesized relationships emerged for firms in stages 1 and 3. However, an overall examination of the relative dominance of problem factors within stages suggests a need to modify the model. Even though problems increased or decreased in importance over time, some were simply more dominant than others all of the time. One implication of that finding is that there could be a hierarchical ordering of the problem factors not envisioned in the model, perhaps the result of the prominence of growth and technology in the firms for which the model was developed. The second implication is that problems may influence stage characteristics not only by their absolute importance to a firm at one time, but also according to their relative importance across stages. That is, a problem could be less dominant than others in all stages and yet increase or decrease in importance from one stage to another. It could thus still be enough of a focus to trigger an organizational learning cycle.

Another conclusion is that this research supports the conceptual argument that stages are not tight, discrete packages of internal characteristics that develop in response to dominant problems, but are instead somewhat fluid, with problems overlapping in adjacent stages (Normann, 1977: 46). In three of four cases where significant differences were found, problems were of equal concern to firms in adjacent stages. The fourth case, the strategic positioning factor, demonstrates the U-shaped relationship discussed above. Reexamination of Table 1, where it can be seen that size and age are more similar for firms in stage 1 and 2 and for firms in stage 3 and 4, supports this conclusion. Interestingly, comparing rate of growth for firms in stages 3 and 4 suggests strong differences as well.

It is important to bound the conclusions regarding the model with an understanding of the limitations of this research. A bias may exist in the data base because the firms that responded were largely successes. They were still in business, and continued existence is a critical measure of performance, especially for early-stage firms. There were no firms that had failed to make a transition from one stage to another. The fact that the firms studied were venture-capitalist backed heightens this effect; experienced investors had seen them as having a high potential for success. Such investors review not only products and business plans, but management talent and organizational issues as well.

The current analyses provide only a cross-sectional view of the firms in their current stage. Their developmental movement and the ultimate success of their framework can only be assessed through longitudinal analyses of multiple waves of data. Even so, the analyses presented provide interesting insights into the growth patterns of technology-based new ventures.

In summary, there is partial support for the contention that the development of such ventures proceeds through a predictable pattern that can be related to the problems a firm finds pressing at sequential times. Results did not, however, completely support the expected pattern. Some problems were more important than others across all stages, and problems and stage characteristics appeared to overlap.

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APPENDIX

Self-Categorized Stage-of-Growth Measures

CEOs were asked to select the description that most closely matched their own firm. Descriptions were not labeled.

Stage 1. Within this company, the primary focus of our activities is on product development and design, securing adequate financial resources and developing a market. Most of our employees have technical tasks but could be considered more as generalists than specialists as we all perform multiple tasks. We more closely resemble a task group than an organization. Formality and procedures are almost non-existent at this firm, but the president/entrepreneur is central to all functions and communications.

Stage 2. The company has a product that performs well and meets a need in the marketplace. We have the capability to produce and sell but we have yet to firmly establish the company in the market. The president/entrepreneur is central to all functions and communications. The firm has some revenues and some backlog of orders.

Stage 3. The company is characterized by high growth rates in both sales and number of employees. The major internal focus is around issues of how to produce, sell and distribute the products in volume while attaining profitability. Internal structure and communication is becoming more formal and increasingly individuals are assuming specialist roles. The company has a single product line.

Stage 4. Within this company, the major internal activities include: (a) development of 2nd, 3rd generation products and/or totally new product lines; (b) securing growth funding; (c) securing or growing market share; (d) penetrating new geographic territories. The firm has a formality of organization structure, rules and procedures. A top management team composed of some individuals with broad industry experience is in place or being built.

Dominant Problem Ratings

CEOs were asked the degree to which the following problems were currently the focus of management attention and resources. Responses were captured on a 7-point scale, with 1 = a minor issue of concern at this time, 4 = somewhat of an issue of concern at this time, and 7 = extremely dominant issue at this time.

1. Developing a new product or technology application
2. Securing financial resources and backing
3. Acquiring key outside advisors or board members
4. Product support or customer service
5. Attracting capable personnel
6. Adequate facilities and/or space
7. Developing a network of reliable vendors and suppliers
8. Produce in volumes adequate to meet demand
9. Meet sales targets
10. Management depth and talent
11. Cost control
12. Definition of organizational roles, responsibilities and policies
13. Management information systems
14. Attaining profitability or market share goals
15. Penetrating new geographic territories
16. Administrative burden and red tape
17. Development of financial systems and internal controls
18. Establishing a firm position in product/market segments

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RELATING PORTER'S BUSINESS STRATEGIES TO ENVIRONMENT AND STRUCTURE: ANALYSIS AND PERFORMANCE IMPLICATIONS

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This study investigated the relationships of Porter's business strategies to the structures and environments of undiversified firms. It was shown that strategies must be matched with complementary environments and structures to promote success. The strategy of innovative differentiation is most likely to be pursued in uncertain environments and correlates with the use of technocrats and liaison devices. The strategy of cost leadership is associated with stable and predictable environments and correlates with the use of controls. Unfocused strategies make much use of liaison devices. These relationships were more likely to be significant in groups of high-performing firms than in groups of poor performers.

The relationships between strategy and structure have received much attention in the literature. Chandler's (1962) thesis that structure follows strategy was supported by the results of his own study as well as by the work of Channon (1973), Rumelt (1974), and others. Unfortunately, those researchers characterized strategy mainly by diversification and structure by divisionalization and largely ignored the environments motivating relationships between the two. Moreover, empirical analyses of the relationships between environment and strategy failed to consider structural dimensions (Hofer, 1975; Hambrick, 1983a, 1983c, 1985; Jauch, Osborn, & Glueck, 1980; Miller & Friesen, 1986).

Recently, however, characterizations of business strategies have become very rich, allowing a relatively more detailed examination of the relationships of strategy to both its structural and environmental contexts (Miller, 1986; Porter, 1980; Venkatraman & Camillus, 1984). This research develops a normative model relating organizational structure and environment to business-level strategy in undiversified firms.

The theme of this study is that the generic business strategies identified by Porter (1980)—or, more precisely, refined versions of them—can di-

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This paper is dedicated to the memory of Dr. Edward G. Lesko (1942–85), inspired teacher and philosopher, and valued friend. The author would like to thank Jean-Marie Toulouse, Jeannine Robichaud, Rose Fong, and Michelle Mark for their assistance with this research. He is also grateful to the government of Quebec Formation de Chercheurs et d'Action Concertee (FCAC) program for grant #EQ1867 and to the Social Sciences and Humanities Research Council for grant #494-84-0012.

rectly influence external environments both by changing competitive conditions and by influencing the selection of target niches. Strategies can also influence choices of structures through the particular coordinative, technical, and control problems they create. The environments and structures chosen will in turn influence strategies. A central contention of this research is that good performers will exhibit significant complementarities of strategy with structure and environment, so that the relationships predicted in the model will often be more significant among good than among poor performers.

To allow the free expression of strategic choice in our research, we elected to study autonomous enterprises rather than the strategic business units that are so often constrained by corporate policy.

PREVIOUS RESEARCH

Traditional contingency theorists have argued that innovation, and the uncertain environments that seem to necessitate it, require organic (Burns & Stalker, 1961), decentralized, differentiated (Lawrence & Lorsch, 1967), and intensively integrated (Galbraith, 1973; Thompson, 1967) structures. Because those authors saw strategies as necessary responses to environments more than as influencers of environments, their tone has been deterministic (Child, 1972). Indeed, they have taken performance to be a function of the match between organization and environment, without explicitly considering strategy. Hoping to avoid such determinism, we attempted to establish the impact of strategic choice on environment and structure (Bourgeois, 1980; Child, 1972; Hrebiniak & Joyce, 1985; Lenz, 1981).

Other researchers have studied strategies and described them in detail (Dess & Davis, 1984; Hambrick, 1983a, 1983c, 1985; Hatten, Schendel, & Cooper, 1978; Miller & Friesen, 1986). Unfortunately, and perhaps because of the nature of their data, they have chosen to ignore organizational structure, investigating the possibility that strategy alone can contribute to good performance if it suits a firm's environment. This research extends that notion, arguing that strategy is related to both environment and structure and that many of these relationships have implications for performance.

Chandler (1962), Channon (1973), Rumelt (1974), and others did study the relationships between strategy and structure. But current characterizations of the two categories should go well beyond the now commonplace considerations of diversification and divisionalization. Indeed, the focus in this research was on the strategies of undiversified firms.

Finally, although Hofer (1975), Miles and Snow (1978), Miller and Friesen (1977), and Snow and Hrebiniak (1980) described business strategies in detail, their work predates the more theoretically sophisticated strategic notions of Porter (1980). Also, they characterized structure using gross and simple scales, neglecting to investigate the statistical relationships among strategy, its context, and economic performance. The present study assessed such relationships using more refined, multiitem measures.

FOUR GUIDING THEMES

Four main themes guided the present investigation. The first is that strategy has strong relationships with environment. As much of the traditional contingency literature suggests, environment can and should influence strategy (Burns & Stalker, 1961; Dess & Beard, 1984; Hambrick, 1983b, 1985; Miller & Friesen, 1984; Zaltman, Duncan, & Holbek, 1973). For example, innovation and marketing differentiation are typically more necessary in dynamic and uncertain environments (Burns & Stalker, 1961; Porter, 1980). Industrial economists have adopted a similar stance, claiming that industrial structure influences conduct—that is, strategy (Porter, 1980; Scherer, 1980). But there is also some latitude for a firm to select its strategy (Child, 1972; Hrebiniak & Joyce, 1985). And strategy can influence environment, causing a firm to gravitate toward customers with particular preferences and inviting retaliation in kind from competitors (Lenz, 1981). Probably, both causal directions interact in an iterative, dynamic process: strategy defines for attention particular niches of an environment, and environment, through customer needs and competitors' challenges, induces strategic adaptation. Such mutual causality is likely to be the rule. It will be argued that the matching of strategy and environment can influence performance—a poor match can hurt performance.

The second theme is that Porter's business strategies will have a profound influence on organizational structure through the coordinative, technical, and control tasks they entail (Porter, 1980: 40–41). For example, a strategy of innovation requires technocrats—well-trained experts such as scientists and engineers—to design innovations. The presence of technocrats increases structural specialization, or the variety of positions in a firm. The complex, multifunctional problems involved in the design and implementation of innovations then require collaboration among marketing, financial, and engineering personnel. Those problems create reciprocal interdependencies that require liasion devices (Mintzberg, 1979; Thompson, 1967). Conversely, structure can constrain and influence strategy. For example, a large and powerful technocratic component can motivate more innovation. Again, these relationships are likely to be dynamic, reciprocal, and iterative and are expected to influence performance.

The third theme is a negative one: neither strategies nor structures alone, nor a suitable match between environment and structure, will be adequate to ensure good performance. For example, a strategy of innovation will fail unless it addresses an environment that values novelty and is accompanied by a structure that can produce it. Similarly, a matching of only structure and environment with each other will be inadequate if either conflicts with the selected strategy. For example, a strategy of product innovation may be unrewarding in a stagnant, price-conscious environment, no matter what the structure. In short, complementarities of strategy with both environment and structure may be needed for good performance.

The fourth and final theme is that although strategy will relate strongly to both structure and environment, because of the operation of strategic choice (Child, 1972; Hrebiniak & Joyce, 1985), structure and environment will themselves be only weakly related. Different strategies with very different structural requisites may thrive in very similar environments. For example, conditions of equifinality may allow both strategies of innovation and of marketing differentiation to succeed in uncertain markets, but each will require very different structures. Structure and environment will thus be indirectly, and therefore weakly, related.

The four themes guided the research hypotheses: the first theme pertained to Hypotheses 1 through 4 and to Hypothesis 9, which is a normative statement; the second to Hypotheses 5 through 8 and to Hypothesis 9; the third to Hypotheses 10 and 11; and the fourth to Hypothesis 12.

HYPOTHESES

The relationships to be discussed in Hypotheses 1 through 8 are expected to contribute to good performance. They are predicted to be strongest for successful groups of firms. Although the tone of the discussion may at times seem deterministic, mutual causality and dynamic and iterative processes of adjustment between environment and strategy and between strategy and structure are believed to be the rule (Child, 1972; Hrebiniak & Joyce, 1985; Venkatraman & Camillus, 1984).

Previous research (Dess & Davis 1984; Hambrick, 1983a; Miller & Friesen, 1985b) has established that Porter's generic strategies are not mutually exclusive—a firm can pursue several simultaneously. Investigators have concluded that the strategies are really dimensions along which firms can score high or low. That position was adopted in the present research.

Strategy and Environment

Porter (1980) distinguished three generic strategies: differentiation, cost leadership, and focus. The strategy of *differentiation* aims to create a product or service that customers see as unique. Porter argued that, by creating customer loyalty and price inelasticity, this strategy erects competitive barriers to entry, provides higher margins, and reduces the power of buyers who feel they lack acceptable substitute products. Miller (1986) noted that there are at least two different types of differentiation strategies: those based on product innovation and those based on intensive marketing and image management. The first strives to create the most up-to-date and attractive products by leading competitors in quality, efficiency, design innovations, or style. The second attempts to create a unique image for a product through marketing practices. The literature offers examples of the two differentiation strategies. Miles and Snow's (1978) prospectors and Miller and Friesen's (1984) S1B adaptive firms and S5 innovators pursue strategies of innovative differentiation. Miller and Friesen's (1984) S1A adaptive firms and S3 mature giants pursue strategies of marketing differentiation.

Differentiation via product innovation often involves new technologies, unforeseen customer and competitor reactions, and the confluence of many unstructured marketing problems (Hofer & Schendel, 1978; Miles & Snow, 1978; Miller & Friesen, 1984; Zaltman et al., 1973). All of these increase environmental unpredictability—the difficulty of forecasting the behavior of competitors and customers (Khandwalla, 1977). It is difficult to know just how customers and competitors will react to very new offerings and to anticipate the various problems that might occur. Moreover, product innovation is generally more prevalent and useful in dynamic environments—for example, the software industry—in which products and practices change quickly (Duncan, 1972). Without innovation, firms in such settings fall behind, losing market share and sales. When innovations induce competitors to retaliate, the result is a still more dynamic and unpredictable environment and the need for further change to maintain effective differentiation (Scherer, 1980). In stable, predictable markets where customers want a standard product— such as kraft paper—at the lowest price, innovation is not often needed; it represents a costly luxury (Miller & Friesen, 1984).

> *Hypothesis 1: The strategy of innovation will be positively associated with environmental uncertainty (unpredictability and dynamism).*

The strategy of marketing differentiation attempts, through advertising, prestige pricing, and market segmentation, to create a unique image for a product. The pursuit of superiority in design does not necessarily accompany that attempt. The strategy requires that managers have a good understanding of customer preferences and competing products, since uniquely appealing offerings are sought to inspire buyer loyalty and reduce price elasticity (Davies & Lyons, 1982; Porter, 1980). The strategy may be especially economical and useful, at least in the short run, in an unpredictable and dynamic environment where it can be used to avoid potentially more costly forms of competition like price cutting or innovation (Hambrick, 1983a; Hofer & Schendel, 1978; Porter, 1980).

Marketing differentiation also involves multifaceted and subtle competition. A firm may try to appeal to customers on the basis of an image of quality, reliability, convenience, or prestige (Scherer, 1980). Such appeals require anticipating complex customer motivations and buying patterns, potentially enhancing the element of unpredictability. (Although marketing research can reduce this unpredictability, customer psychology is often too subtle and complex to be susceptible to reliable forecasting.) Also, differentiation is likely to invite competitive responses, thereby increasing not only unpredictability but market dynamism as well. Competitors may imitate successful practices, requiring further change.

> *Hypothesis 2: Marketing differentiation will be positively associated with environmental uncertainty (unpredictability and dynamism).*

Porter's (1980) strategy of *cost leadership* requires firms to become the lowest cost producers in an industry. Much effort is devoted to cost control so that above-average returns can be obtained even with low prices. Miles and Snow's (1978) "defenders" pursue this strategy, as do Hambrick's (1985) "efficient misers" and "cost leaders." Users of this strategy are likely to confront the least environmental unpredictability and change. They seek out customers who care more about price than about image or novelty, so product innovation will often be superfluous and inefficient for both a firm and its direct competitors. This makes for great stability.

Environments that are unpredictable or subject to much change will create severe diseconomies for firms trying to pursue cost leadership. The many alterations needed to cope with external challenges would thwart efficiency, the sine qua non of cost leadership. Also, stability and an exclusive focus on price and price-conscious customers increase predictability—market responses become much easier to forecast when only price matters. (The meat-packing business is an example of such an environment.)

> *Hypothesis 3: The strategy of cost leadership will be inversely associated with environmental uncertainty (unpredictability and instability).*

Porter's (1980) final generic type, the strategy of *focus*, caters to a circumscribed and specialized segment of a market—a certain kind of customer, a limited geographical area, or a narrow range of products. According to Porter, the focus strategy "rests on the premise that the firm is . . . able to serve its narrow strategic target market more effectively or efficiently than competitors who are competing more broadly. As a result, the firm achieves either differentiation from better meeting the needs of the particular target, lower costs in serving this target, or both" (1980: 38).

Porter's focus dimension is the opposite of strategic breadth. A broad strategy will generally require a firm to confront and acknowledge great heterogeneity, that is, many differences in customer and competitor behavior in its target markets (Thompson, 1967). Conversely, if its target markets are very heterogeneous, a firm with focused products and methods might have to spread itself too thin, pursuing many inappropriate customers in the wrong ways. It may therefore have to seek out a homogeneous environment to maximize returns. But the association between strategic breadth and market heterogeneity is not tautological—some firms sell a narrow line of products to very different markets (e.g., computer software to home and industrial markets); others make very different products for the same market (e.g., metal, plastic, and wooden home furniture).

> *Hypothesis 4: Strategic breadth will be positively associated with market heterogeneity.*

Focus can reduce the information-processing burden of managers, allowing a depth of knowledge that enhances predictability. However, there are many narrowly focused firms operating in highly unpredictable settings and very broad or unfocused ones operating in extremely predictable settings. For example, in the 1960s, Control Data Corporation operated in a highly focused, but notoriously turbulent, segment of the mainframe computer business. Thus, strategic breadth is not expected to correlate with environmental unpredictability or dynamism.

Strategy and Structure

The strategy of innovative differentiation has many implications for organizational structure. New-product development and implementation require the employment of experts who can identify the crucial parameters of an intricate, nonroutine design or marketing decision. Specialized, highly trained professional technocrats such as scientists and engineers are indispensible for devising, assessing, implementing, and continually changing complex product designs (Burns & Stalker, 1961; Hage & Aiken, 1970; Mintzberg, 1979; Zaltman et al., 1973).

New-product development also requires the collaboration of specialists and functional managers from different areas of a firm. Those individuals must, for example, evaluate and implement a new design, bearing in mind marketing, financial, production, and engineering considerations. Complex, unstructured problems having no routine solutions need to be addressed through face-to-face contacts among functional experts and professionals (Lawrence & Lorsch, 1967). Research and development staff members have to resolve rapidly emerging manufacturing problems with production engineers, who must deliberate pricing, packaging, and warranty issues with marketing specialists. Complexity thus creates reciprocal interdependencies that require close contact among managers (Galbraith, 1973; Thompson, 1967). Integrative liaison devices such as task forces and committees that allow regular, personal, and intensive contact among experts and decision makers of different departments greatly facilitate such collaboration.

Finally, complexity and changes in product designs create the need for the delegation of authority to the experts most capable of making critical decisions (Burns & Stalker, 1961; Miller & Friesen, 1984; Mintzberg, 1979; Thompson, 1967). Top executives may be too remote from a situation or too untrained to make the necessary judgments.

But again we expect reciprocal causality, as structure can also influence strategy (Lenz, 1981; Miller, 1987b). For example, technocrats such as scientists and engineers exert pressure to introduce new products and methods, and liaison devices may afford them a political forum in which to lobby for their ideas. This situation is especially likely where technocrats have been delegated much authority to implement their proposals. In contrast, few managers are likely to push for innovation in the absence of technocrats, and those who do are not likely to have much influence in a centralized, fragmented structure.

> *Hypothesis 5: The strategy of innovative differentiation will be positively associated with the use of liaison devices, technocrats, and delegation.*

The strategy of marketing differentiation is likely to involve fewer and less complex product-line and structural changes than that of innovative differentiation. The changes often concern relatively incremental tactics such as launching a new advertising campaign, establishing more convenient distribution channels, and altering packaging. Unlike major product innovations, such changes can be inexpensive and easily reversed if they fail, and they demand the efforts of only few experts. They also mainly involve a firm's marketing department. As a result, technocrats may be found primarily in that area, which, given the strategic emphasis, may dominate the other departments. But, compared to firms practicing innovative differentiation, firms whose strategy is marketing differentiation will have few technocrats responsible for innovation. Coordinative liaison devices such as task forces may be used less frequently or used mainly within the marketing department since production and R & D people are not often or dramatically influenced by changes in marketing practices or by minor changes to a product. Authority is likely to be delegated to the marketing department, but may be withheld from other areas. Limiting the use of these structural devices is sensible, as liaison committees, technocrats, and delegation can be wasteful where a strategy does not require them—and marketing differentiation often does not.

Again, it may be useful to interject a cautionary note concerning reciprocal causality. The empowerment of its marketing personnel and the hiring of marketing experts could well induce a firm to favor the strategy of marketing differentiation.

> *Hypothesis 6: The marketing differentiation strategy will not be associated with the use of technocrats, liaison devices, or delegation of authority.*

Generally, the cost leadership strategy requires that product lines remain rather stable and that innovations deal mainly with production processes (Porter, 1980). But given the strategy's emphasis on efficiency, costly changes even in production processes will be rare (Miller, 1986). There will be a strong emphasis on formal profit and budget controls—an aspect of formalization—in order to keep costs, and thus prices, at a minimum (Henderson, 1979; Miles & Snow, 1978; Porter, 1980). Unvarying products and procedures allow the division of work into its elementary components, those that are routinized, standardized, and ideal for unskilled personnel (Mintzberg, 1979). Thus there is little need for technocrats such as scientists and engineers who are most useful for handling complex, unstructured problems. Here, such individuals might be underutilized, bored, and too expensive. Because the routine nature of operations causes managerial interdependencies to be pooled or sequential rather than reciprocal (Thompson, 1967), coordination can be effected mainly through formal controls and hierarchies. Therefore, *liaison* devices such as task forces and cross-functional committees are costly luxuries. Formal controls can also substitute for delegation of authority (Blau & Schoenherr, 1971), as top managers can master much of the administrative task by themselves (Miller, 1987b; Mintzberg, 1979).

> *Hypothesis 7: The cost leadership strategy will be inversely associated with the use of technocrats, liaison devices, and delegation and positively associated with the use of formal controls.*

Firms making products that require disparate production technologies or marketing techniques face many contingencies (Hambrick, 1983a).

Generally, such strategic breadth requires that the administrative task be divided. The numbers of managers and levels of specialization increase, along with the need to ensure proper coordination and control (Blau & Schoenherr, 1971). Formal controls such as budgets and cost centers must be used to assess subunit performance (Khandwalla, 1977), and liaison devices can help to ensure coordination among numerous and diverse subunits. Also, authority must be delegated to reduce the administrative burden of top managers (Chandler, 1962; Sloan, 1964). The challenge of diversity may also have implications for the use of such technocrats as accountants, corporate planners, and information system specialists who design financial controls and advise and support coordinative committees (Galbraith, 1973; Mintzberg, 1979). In contrast, a homogeneous product line and marketing approach simplify the administrative task and require little use of all four structural devices.

> *Hypothesis 8: Strategic breadth will be associated with the use of technocrats, delegation, liaison devices, and formal controls.*

Aggregate Hypotheses

The complementarities or congruencies of strategy with structure and environment suggested by Hypotheses 1 through 8 were expected to be associated with good performance. Hence,

> *Hypothesis 9: The associations predicted by Hypotheses 1 through 8 will be stronger in groups of high performers than in groups of low performers.*

According to this study's third major theme, however, the simple presence of a certain strategy or structure will not produce success. For example, an innovative strategy either in the wrong environment or with an inappropriate structure would prevent good performance.

> *Hypothesis 10: The associations of strategy and structure with performance will not be significant.*

The same logic would apply if a suitable match were to exist between structure and environment. Such a match would not contribute to good performance without an appropriate strategy.

> *Hypothesis 11: The associations between environment and structure will not differ between successful and unsuccessful groups of firms.*

Note that Hypothesis 10 concerns relationships of the individual variables of strategy and environment to performance, whereas Hypothesis 11 concerns the performance implications of the match between environment and structure.

It has been argued that different strategies can successfully address the same environments. According to Hypotheses 1 and 2, both innovative and marketing differentiation can succeed in unpredictable and dynamic environments. It has also been argued that innovative differentiation and marketing differentiation strategies require very different structures (Hypotheses

5 and 6). So it follows that the link between environment and structure will be rather a loose one because of this latitude for strategic choice. That idea conflicts with the notions of Burns and Stalker (1961) and Lawrence and Lorsch (1967), who argued for a close relationship. But those researchers did not provide very strong empirical substantiation for their views, relying on small samples, anecdotal data, and little or no statistical analysis. Also, they may have unwittingly controlled for strategy in their samples.

Hypothesis 12: The associations between environment and structure will not be significant.

Table 1 summarizes the hypotheses.

METHODS

Sample

This study dealt with strategy at the top of undiversified, autonomous companies. There is no real difference between business and corporate strategies in such organizations. Divisions or strategic business units were not studied, as many adopt structural devices to conform to the policies of their head offices rather than to implement their own strategies. Also, transfer pricing and other corporate anomalies may make divisional financial performance difficult to assess.

The final sample consisted of 89 firms, all from the province of Quebec. Firms were selected randomly from lists, published in the magazines *Commerce* and *Les Affaires*, which represent a fairly exhaustive inventory of significant Quebec firms by industry. To stay within our research budget, we chose only firms from the greater Montreal and Quebec City areas. Sales ($\bar{x}$ = \$9 million, s.d. = \$24 million, range = \$2–\$200 million) and numbers of employees ($\bar{x}$ = 160, s.d. = 195, range = 7–1,000) were quite small. Many firms were tightly held, by either a single owner, a family, a group of partners, or a holding company. A tremendous diversity of industries was represented. They included electronics, financial services, home appliances, food and beverages, industrial equipment, lumber, construction, retailing, and mining. No industry represented more than 5 percent of the total sample. About 85 percent of the firms were run by Francophones and operated in the French language. Of the 123 undiversified firms—those operating in only one industry—contacted by telephone, 72 percent agreed to participate in the study. Participants were told that this was a study of general managerial practices, and confidentiality was guaranteed to all respondents and firms.

Data Collection

The questionnaire was administered in person to the chief executive officer (CEO) and to the most senior vice president or the general manager of each firm by two field researchers with graduate degrees who were trained by my co-researchers. The interviewers were given definitions of the scales and examples of what might constitute high and low scores. Administration

TABLE 1
The Hypotheses Summarized

(a) Specific Hypotheses

		Environment[a]				Structure[a]			
Strategy		**Unpredictability**	**Dynamism**	**Heterogeneity**		**Liaison Devices**	**Technocrats**	**Delegation**	**Formal Controls**
Innovative differentiation	H1:	+	+		H5:	+	+	+	
Marketing differentiation	H2:	+	+		H6:	0	0	0	
Cost leadership	H3:	−	−		H7:	−	−	−	+
Breadth (lack of focus)	H4:			+	H8:	+	+	+	+

(b) General Hypotheses

H9: Hypotheses 1 through 8 are expected to be more strongly supported in groups of good performers than in groups of poor performers.
H10: The relationships of strategic and structural variables with performance will not be significant.
H11: The relationships between environment and structure will not differ significantly between good and poor performers.
H12: The relationships between environment and structure will not be significant.

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[a] A + indicates an expected positive and significant relationship, a − indicates a significant negative relationship, and 0 an insignificant relationship.

occurred after the interviewers, accompanied by a team of M.B.A. students, had spent several hours per week for several weeks interviewing the managers of the functional areas and writing a case study of the firm. The case studies were used to establish the validity of the executives' ratings. The CEOs completed the questions on strategy and performance with the help of the interviewers, who explained the strategic scales during the interviews. CEOs were not present at interviews with general managers and senior vice presidents. Those respondents answered questions about the administrative structure of their organization and its environment. In other words, different respondents reported on the strategy and on the structure of each firm. This was intended to avoid some of the spurious correlations that common method variance might cause.

Measurements

Correlation analysis was used to assess multicollinearity for the regression analyses. It should be noted that the dictates of parsimony and the scope of the research constrained the selection of variables. The set of variables is representative, not exhaustive.

The Appendix presents the measurement scales, which were taken from previous studies. All but one structural variable and all environmental variables were from Miller (1983). The delegation variable was taken from the Aston research (Inkson, Pugh, & Hickson, 1970; Pugh & Hickson, 1976). The strategic composite variables were suggested by Miller (1986, 1987a). Table 2 gives the means, standard deviations, alpha coefficients, ranges, and correlations of the variables.

Environment. Managers select very specific market segments and customers for attention. Thus, we decided to concentrate on narrowly defined parts of an environment rather than on overall industry parameters. The former can only be gauged by assessing managers' perceptions of their actual target markets (Dess & Beard, 1984); there are no industry-wide statistics that could serve this purpose (Bourgeois, 1980; Downey, Hellriegel, & Slocum, 1975; Duncan, 1972). Perceived measures were also expected to have the strongest associations with business strategy since it is perceptions that strategists act on (Bourgeois, 1980; Miller & Friesen, 1984).

Environment was assessed using measures of dynamism, unpredictability, and heterogeneity. Although conceptually distinct, dynamism and unpredictability are usually correlated, as the first can give rise to the second. In fact, both are generally considered to be the key components of the overarching construct of uncertainty (Bourgeois, 1980; Dess & Beard, 1984; Downey et al., 1975; Duncan, 1972; Khandwalla, 1977). Correlational analysis confirmed this (Table 2), allowing the combination of the two variables into an overall uncertainty dimension.

To establish whether there was any objective validity to the perceived environmental uncertainty measure, two raters, professors of business policy from Quebec, with Ph.D. degrees in management, read a randomly selected group of 15 of the most detailed case studies that were written about

TABLE 2
Descriptive Statistics and Pearson Correlations[a]

Variables	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13
Environment															
1. Composite uncertainty[b]	3.46	1.06	81												
2. Unpredictability	3.58	1.20	76	47											
3. Dynamism	3.36	1.27	91	45	59										
4. Heterogeneity	3.56	1.63	51	48	43	78									
Structure															
5. Liaison devices	4.91	1.18	05	02	05	06	89								
6. Technocratization	3.66	1.45	06	−06	14	15	24	60							
7. Delegation	3.00	0.46	−05	−05	−04	04	−04	22	82						
8. Formal controls	4.82	1.19	−14	−11	−09	13	20	27	06	76					
Strategy															
9. Differentiation via innovation	3.46	0.68	30	23	27	22	27	26	16	02	64				
10. Cost of innovation	0.05	0.78	30	12	35	15	18	40	03	08	47	82			
11. Cost leadership	2.85	1.45	−13	−16	−08	−07	−20	−09	−11	22	−25	−19	50		
12. Marketing differentiation	3.55	1.39	22	18	21	12	15	10	−06	11	18	08	−29	47	
13. Breadth	3.30	1.45	16	14	15	07	31	15	−04	07	04	−04	05	05	61

[a] N = 89. The theoretical range for most variables is 1 to 7. The two exceptions are delegation, where it is 0 to 5, to be consistent with the initial studies that used the scale, and cost of innovation, where there is no theoretical range because the two component items were standardized to have means of 0 and standard deviations of 1.

Correlation coefficients must be greater than .19, .26, and .30, respectively, to reach the .05, .01, and .001 levels of significance. Cronbach alphas are on the diagonals.

[b] Composite uncertainty is calculated as the mean of the unpredictability and dynamism scales.

the firms. They were instructed to characterize environments as either high or low in uncertainty and were unaware of the values executives had assigned to the related variables. Raters did the rating of each case alone, then met to resolve any disagreements (only two occurred). Raters and executives agreed in all but 1 of the 15 cases. Specifically, firms classified as facing low uncertainty always fell below the median score along the composite uncertainty variable, and firms classified as facing high uncertainty fell above the median score in all but one case.

Structure. Four of the most commonly researched dimensions of structure are delegation, formalization, specialization (Blackburn, 1982; Child, 1974; Fredrickson, 1986; Sathe, 1978), and integration (Galbraith, 1973; Lawrence & Lorsch, 1967; Mintzberg, 1979). Variables that would have the strongest relationships to strategy were selected from each of the four categories. Delegation and integration were measured broadly. But according to the hypotheses of this research, technocratization and controls should be the aspects of specialization and formalization most strongly related to strategy. Items gauging the use of written policies and organization charts were eschewed, as those aspects of formalization seemed too pervasive and general to relate differentially to Porter's strategies. Thus, we measured four variables: the use of liaison (integration) devices, technocrats, delegation, and formal controls. Because strategies were expected to influence actual tasks, we were mostly concerned with emergent structure—the procedures that were actually used—rather than with institutional structure, processes portrayed by policy manuals and organization charts (Ford, 1979; Sathe, 1978). That emphasis favored questionnaire over archival research (Sathe, 1978: 234–236).

Strategy. Composite measures of Porter's strategy dimensions included items upon which both Hambrick's (1983) and Dess and Davis's (1984) panels of experts agreed. Items were refined to measure two types of differentiation—marketing and innovative differentiation. The first set of items gauged advertising intensity, market segmentation, and prestige pricing (Miller, 1986).

Innovative differentiation was measured in two ways. The first employed scales assessing product innovation, new-product development expenditures, and strategic aggressiveness towards competitors, with each of these three dimensions scored and weighted equally and then averaged. The second measure of innovative differentiation used only purely quantitative measures of R & D and new-product commercialization expenses as a percentage of sales. It was used to measure only the most complex type of innovation, that manifested by R & D and product development and commercialization expenses. Such innovations were expected to have more structural implications than cheap, superficial product modifications. All analyses were conducted for both kinds of innovative differentiation.

Cost leadership was gauged using items assessing cost control, price cutting, minimization of marketing and product development costs, and conservatism in responding to markets. Capacity utilization and indices of production efficiency—integral aspects of Porter's (1980) dimension—were not measured because they apply only to manufacturing firms.

As Table 2 shows, the reliabilities for the strategic variables are in general slightly lower than those for the environmental and structural variables. Porter's (1980) strategies constitute rather multifaceted constructs. The literature indicates some independence—even substitutability—among the subcomponents of his generic strategies (Hambrick, 1985; Miller, 1986). For example, in a marketing differentiation strategy, market segmentation can sometimes substitute for intensive mass advertising (Porter, 1980; Scherer, 1980). Still, the reliabilities for the multifaceted variables are acceptable, according to the criteria of Van de Ven and Ferry (1979: 76–78), but they are not as high as we had wished.

The validity of the strategic scales was assessed through use of the same 15 cases and the same method employed for environmental uncertainty. The raters were asked to classify firms as high or low on innovative and marketing differentiation, cost leadership, and breadth. A match was said to occur if a high (or a low) classification corresponded to a score above (or below) the median for the overall strategy dimension, as scored by the executives. Matches occurred in 14, 13, 14, and 13 out of 15 responses for the four respective strategies.

Performance. To ensure its unambiguous assessment, performance was measured with three distinct indices. Five-year (1978–83) averages of return on investment and growth in net income were obtained from financial statements. Also, CEOs were asked to compare the profitability of their firms for the last five years to that of their major competitors. We divided the sample into clearly successful and clearly unsuccessful firms. The unsuccessful subsample ($N = 43$) included only firms that scored below the means for each of the following: return on investment (the total sample's mean was 23 percent; the unsuccessful sample's mean was 13 percent), five-year growth in net income (the total sample's mean was 25 percent; the unsuccessful sample's mean was 11 percent), and five-year profitability relative to competitors (the last scale was subjectively scored by the CEOs). The successful subsample ($N = 37$) included firms that scored above the means for those variables, with 28 percent for return on investment and 35 percent for five-year growth in net income. The subsamples differed along all three performance indicators at beyond the 0.001 level under a one-tailed t-test. We deleted nine firms with mixed high and low performance indicators from all subgroup and interaction analyses.

Analyses

Hypotheses 1 through 8 were tested using correlational and multiple regression analyses (Tables 2 and 3). In the regression analyses, strategies served as the dependent variables. The use of both types of analysis provides a broad basis for inference. Hypothesis 9, concerning the differences in the relationships between high and low performers, was tested in three ways. Table 4 presents and compares the first-order correlations in the two performance subsamples by means of the Fisher's Z-transformation test. This bivariate analysis was used to explain any anomalous regression results. Table 5 presents and compares the regression coefficients in the performance subsamples, again taking strategy as dependent; differences were tested using a Z-test on the unstandardized regression coefficients.[1] Finally, we analyzed the significance of the interaction components of performance and the independent variables that, as shown in Tables 4 and 5, differed significantly or almost significantly among the performance subsamples.[2] Interaction terms were products of the independent variables of interest and of a performance dummy, with values of 0 and 1 according to whether a firm fell into the high- or low-performing subsamples. The interaction terms were entered one at a time in descending order of magnitude, and the significance of the additional variance explained by each was calculated using the partial *F* statistic.

Because the intercorrelations among all three environmental variables were generally strong (see Table 2), a composite index of uncertainty—unpredictability plus dynamism—was used in all the regression equations, and the measure of heterogeneity was deleted. Those procedures avoided problems of multicollinearity.

It was desirable to rule out the possibilities that (1) the simple adoption of certain strategies or structures (Hypothesis 10) or (2) the matching only of environment to structure (Hypothesis 11) could alone improve performance. To test Hypothesis 10, multiple regression equations (not shown) were calculated, with performance compared to that of competitors in the same industry, five-year growth in net income, and return on investment as the dependent variables. The strategic and structural dimensions were the independent variables. The measurement of relative performance helped to control for any potential systematic differences in profitability across industries. To avoid multicollinearity due to the significant intercorrelation between the two measures of innovative differentiation, only the cost of innovation was used in the analyses. To eliminate the possibility (Hypothesis 11) that the match between structure and environment contributes to performance no matter what strategy is being pursued, regression equations (not shown) were calculated to compare the relationships between structure and environment in the successful and unsuccessful subsamples. Z-tests were used to compare unstandardized regression coefficients and Chow tests were used to compare the overall equations.

Finally, Hypothesis 12, which predicted weak associations between structural and environmental variables, was tested by estimating the relationships between structure and environment on the basis of correlations shown in Table 2 and the results of regression equations (not shown).

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[1] Chow tests comparing the overall regression equations were deemed to be too gross as only certain relationships were predicted to differ between the subsamples.

[2] To save space, this analysis is not shown; it is available from the author.

RESULTS

Strategy and Environment: Hypotheses 1 Through 4

Tables 2 and 3 both show innovative differentiation and cost of innovation to correlate with composite uncertainty and dynamism. Innovative differentiation also correlates with unpredictability; cost of innovation does not. So the findings largely bear out Hypothesis 1. Marketing differentiation is related to composite uncertainty, unpredictability, and dynamism, confirming Hypothesis 2.

As predicted, cost leadership did correlate negatively with composite uncertainty, unpredictability, and dynamism. But those relationships never reached statistical significance. So Hypothesis 3 received little support. Finally, contrary to Hypothesis 4, strategic breadth did not correlate significantly with heterogeneity.

Strategy and Structure: Hypotheses 5 Through 8

Table 2 shows that innovative differentiation correlated significantly with the use of liaison devices, technocrats, and delegation and that cost of innovation also correlated with liaison devices and technocratization. Thus, the correlational analysis largely confirms Hypothesis 5. But the regression analysis (Table 3) fails to support the relationship with delegation, which did not relate to any strategy.

Hypothesis 6 states there will be no relationships between marketing differentiation and structure. All the analyses bore out that prediction, except that there was a low-order correlation between marketing differentiation and use of liaison devices (Table 2).

The relationships of cost leadership to the use of liaison devices, technocrats, and delegation were, as expected, negative in both the correlational and the regression analyses, but only the link with liaison devices reached statistical significance. As anticipated, the relationship with formal controls was positive. So Hypothesis 7 receives only partial support.

Breadth was expected to have a positive relationship with all structural variables. But only the relationship with liaison devices reached significance, as shown in Tables 2 and 3. So Hypothesis 8 is not confirmed.

Performance Implications: Hypothesis 9

Hypothesis 9 states that Hypotheses 1 through 8 will be more strongly supported among good than among poor performers. That prediction was tested by comparing the subsample correlations and regression coefficients shown in Tables 4 and 5 and confirming any significant differences by examining the related interaction terms.[3]

The relationships between *strategy and environment* are addressed first. Results of the Fisher's Z-transformation tests and the Z-tests (Tables 4 and 5) respectively show that there are no significant differences between the per-

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[3] Details of the analysis are available from the author.

TABLE 3
Relationships of Strategy with Environment and Structure for the Total Sample[a]

	Strategic Dimensions				
Independent Variables	Differentiation via Innovation	Cost of Innovation	Marketing Differentiation	Cost Leadership	Breadth (Focus)
Composite uncertainty	.28**	.28**	.23*	−.08	.14
Liaison devices	.24*	.08	.10	−.24*	.28**
Technocrats	.17	.37***	.05	−.08	.08
Delegation	.15	−.04	−.06	−.13	−.04
Formal controls	−.05	.00	.11	.29**	.00
R^2	.213	.244	.085	.146	.122
Overall F[b]	4.480	5.367	1.542	2.830	2.298
p	.001	.000	.186	.021	.052

[a] N = 89.

[b] $df = 5, 83$.

† $p < .10$, one-tailed t- or F-test.

* $p < .05$, one-tailed t- or F-test.

** $p < .01$, one-tailed t- or F-test.

*** $p < .001$, one-tailed t- or F-test.

TABLE 4
Pearson Correlations of Strategy with Environment and Structure for the Performance Subsamples[a]

	Strategic Dimensions									
	Differentiation via Innovation		Cost of Innovation		Marketing Differentiation		Conservative Cost Leadership		Breadth (Focus)	
Independent Variables	S	U	S	U	S	U	S	U	S	U
Environment										
Composite uncertainty	.44**	.19	.32*	.34**	.41*	.04^{aa}	−.34*	.03^{aa}	−.04	.12
Unpredictability	.39*	.21	.20	.13	.32*	.04	−.38*	.13^{bb}	−.01	.06
Dynamism	.40**	.14	.35*	.40**	.38*	.06	−.25†	−.03	−.05	.16
Heterogeneity	.31*	.26†	.18	.25†	.15	.10	−.17	−.06	−.07	.26†
Structure										
Liaison devices	.32*	.27†	.27*	.13	.10	.21†	−.18	−.33*	.38**	.20
Technocrats	.18	.34*	.52***	.12^{bb}	−.03	.18	.04	−.12	.19	.17
Delegation	.13	.12	.06	−.13	−.16	−.10	−.03	−.15	−.02	−.24†
Formal controls	−.13	.14	.13	−.01	.13	.11	.34*	.09	.07	.08

[a] S = the successful subsample ($N = 37$) and U = the unsuccessful subsample ($N = 43$); the superscripts ^{aa} and ^{bb} indicate that the coefficients of the two subsamples are significantly different at the .10 and .05 levels, respectively, on the basis of Fisher's Z-transformation.

† $p < .10$, one-tailed test.

* $p < .05$, one-tailed test.

** $p < .01$, one-tailed test.

*** $p < .001$, one-tailed test.

TABLE 5
Results of Multiple Regression Analyses of Strategy with Environment and Structure for the Performance Subsamples[a]

	Strategic Dimensions									
	Differentiation via Innovation		Cost of Innovation		Marketing Differentiation		Conservative Cost Leadership		Breadth (Focus)	
Independent Variables	S	U	S	U	S	U	S	U	S	U
Environmental uncertainty	.40**	.30*	.21	.35*	.48**	.06^{aa}	−.31†	.04^{bb}	−.07	.10
Liaison devices	.33*	.22	.07	.11	.16	.15	−.27	−.40*	.36†	.12
Technocrats	.04	.31*	.53**	.15^{bb}	−.30	.16^{bb}	.05	−.07	.10	.17
Delegation	.12	.22	−.09	−.04	−.18	−.06	−.10	−.21	−.09	−.20
Formal controls	−.23	.13^{bb}	−.12	.03	.32†	.07	.38*	.17	−.05	.04
R^2	.335	.272	.344	.161	.289	.077	.283	.191	.151	.113
Overall F	3.13	2.77	3.25	1.42	2.52	.62	2.45	1.74	1.11	.94
p	.021	.032	.018		.05		.056			
df	5, 31	5, 37	5, 31	5, 37	5, 31	5, 37	5, 31	5, 37	5, 31	5, 37

[a] S = the successful subsample (N = 37) and U = the unsuccessful subsample (N = 43); the superscripts ^{aa} and ^{bb} indicate that the coefficients of the two subsamples are significantly different at the .10 and .05 levels, respectively, on the basis of the Z-test.

† $p < .10$, partial F-test.

* $p < .05$, partial F-test.

** $p < .01$, partial F-test.

*** $p < .001$, partial F-test.

formance subsamples in the relationships of environmental uncertainty with differentiation through innovation, cost of innovation, or breadth. Innovative differentiation does, however, show significant relationships at beyond the 0.05 level with all aspects of uncertainty in the successful subsample, whereas in the unsuccessful subsample no such relationships emerge. Also, the expected differences between the subsamples appeared in the relationships of uncertainty with marketing differentiation and cost leadership. Those differences emerged in both the correlation and the regression coefficients. The interaction terms for cost leadership confirm these findings. In summary, differentiation through innovation, marketing differentiation, and conservative cost leadership all show the anticipated performance-related differences—but only for the last two strategies are those differences statistically significant.

The differences between the performance subsamples in the relationships between *strategy and structure* reveal mixed results. The findings summarized in Tables 5 and 6 show that the relationships between innovative differentiation and controls differ between the successful and unsuccessful subsamples, both according to the Z-tests and the controls-performance interaction term. Similarly, the relationship of innovative differentiation to the use of liaison devices is significant in the successful, but not in the unsuccessful, subsample. But that difference is not significant. The cost-of-innovation measure of differentiation also shows a significant relationship with technocratization in the successful subsample, but not in the unsuccessful subsample. The coefficients are significantly different according to the results of the Z-tests shown in Tables 4 and 5 and the interaction analysis.

As expected, no subsample differences in the links between marketing differentiation and structure occurred consistently. However, the use of technocrats tended to be more negatively associated with marketing differentiation in the successful than in the unsuccessful subsample, at least according to the results of the regression equations (Table 5) and the interaction analysis. Cost leadership showed only one difference between the performance subsamples—that involving formal controls, which, as expected, tended to be associated with cost leadership more among successful than among unsuccessful firms. However, only the results of the interaction analysis and the significant correlation and regression coefficients demonstrated by the successful, but not the unsuccessful, subsample supported that association (Tables 4 and 5). Since the Z-test statistics failed to reach significance, the result remains tentative. Finally, there were no significant differences between the performance subsamples in the relationships between breadth and structure.

To summarize the findings for Hypothesis 9, most predicted relationships between strategy and environment and some between strategy and structure were more significant in the successful than in the unsuccessful subsample. Table 5 shows that the average R^2 for the regression equations in the successful subsample was .280; it was only .163 for the unsuccessful subsample. In the first group, results of four of the five equations reached significance at about the .05 level or better; in the second group, this was true of only one. Table 4 shows that if the delegation dimension, which had measurement problems, is ignored, data from the successful subsample confirm 15 of the 22 individual predictions, whereas data from the unsuccessful sample support only 7 of them. However, most of the differences in the relationships between the performance samples did not reach statistical significance, so many of the results are not conclusive.

Alternative Explanations of Good Performance: Hypotheses 10 and 11

A major contention underlying this study was that the complementarities that strategies have with structure and environment are important to performance. But are there alternative, and perhaps simpler, determinants of performance? These must now be ruled out.

Hypothesis 10 states that strategies or structures alone—without being matched to one another—will not contribute to performance. Three regression equations (not shown) were computed using relative profitability, growth in net income, and return on investment as the dependent variables and all environment and structural variables as the independent variables. The results confirm the hypothesis. Only 3 of the 24 regression coefficients reach significance at the .10 level, and all involve the same independent variable—delegation. No other structural or strategic variable ever attains significance. So, except for delegation, the hypothesis is supported.

Hypothesis 11 states that the match between environment and structure will be in itself insufficient to ensure good performance—there will be no significant differences in the relationships between environment and structure in successful and unsuccessful groups of firms. This is confirmed by the results of another set of regression analyses of the performance subsamples.[4] Composite uncertainty, unpredictability, dynamism, and heterogeneity were the dependent variables, and the four structural variables were the independent ones. Not only do all 32 relationships between environment and structure fail to reach significance, results for the performance groups never even differ significantly at the .05 level, according to a Z-test. Also, none of the Chow test statistics comparing the overall equations ever reach the .05 level of significance. So Hypothesis 11 is clearly confirmed.

Relating Environment and Structure: Hypothesis 12

Hypothesis 12 states that the relationships between environment and structure will be insignificant. The correlations shown in Table 2 bear out that prediction. Only 1 of the 12 correlation coefficients between environment and structure is significant at beyond the .10 level, whereas 9 of the 18 correlation coefficients between environment and strategy and 10 of the 20 correlation coefficients between structure and strategy are as significant. The last two proportions are each significantly larger than the first at beyond the .01 level, according to Fisher's Exact test. Moreover, the one significant correlation between environment and structure becomes insignificant when strategy is controlled for. The regression analyses referred to in the preceding paragraph confirm these results, indicating that none of the 48 relationships between environment and structure (16 for each of the subsamples and for the total sample) reach significance at even the .10 level.

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[4] These results are available from the author.

DISCUSSION

Strategy and Environment

The findings leave little doubt that Porter's strategies relate to environment. In general, however, the predicted relationships are stronger in successful than in unsuccessful groups of firms. Both innovative and marketing differentiation correlate with, and seem to do best in, uncertain environments. Innovation can provide more competitive products in changing markets (Burns & Stalker, 1961; Porter, 1980; Thompson, 1967; Zaltman et al., 1973), and marketing differentiation can create customer loyalty, thereby allowing less frequent (or less costly) adaptation to an unpredictable, dynamic setting. Cost leadership has a negative relationship with uncertainty, especially among high performers. It can succeed best when its quest for efficiency is tolerated and aided by a stable, predictable setting. These findings were especially convincing, as the alternative predictors of performance (Hypotheses 10 and 11) were ruled out. Thus, the need to match strategy to environment is apparent, whether the match means tailoring strategy to a set of external market parameters or actively seeking out niches that match a firm's existing thrust.

It was surprising that the relationship between breadth and external heterogeneity was insignificant. Perhaps in the present sample of undiversified firms there is insufficient range in those variables to test this relationship.

Strategy and Structure

Liaison devices were more significant predictors of overall innovative differentiation than of cost of innovation; the opposite was true for the use of technocrats. It may be that technocrats lobby for, and themselves represent, high spending for innovation. In contrast, the bold and risky projects inherent in an overall strategy of innovative differentiation might occasion the use of liaison devices.

The cost-of-innovation measure gauges extensive and complex innovation—that requiring many structural devices to ensure good performance (Burns & Stalker, 1961; Lawrence & Lorsch, 1967). Its regression results therefore show significant structure and performance interactions. In contrast, the regression analysis for the broad measure of innovative differentiation, which includes simple, cheap innovations with few structural implications, showed no such interactions.

Marketing differentiation, as expected, did not relate to structure. But there was a negative performance/technocratization interaction. Perhaps, then, the most profitable marketing differentiators avoid extensive innovation, thereby reducing the need for expensive technical employees.

Cost leadership went hand in hand with the use of controls and the deemphasis of elaborate liaison devices, especially among high performers. Tight controls can slash costs, boosting the effectiveness of cost leadership.

Finally, breadth did not have the predicted relationships with structure, nor did those relationships differ between the performance groups. It related only to the use of liaison devices, which no doubt serve to ease the coordinative difficulties entailed by a broad and diverse focus (Mintzberg, 1979).

It was surprising to find virtually no relationships between delegation and differentiation or any other strategy. The Aston measure used gauges the distribution of power to make very routine decisions, such as setting delivery dates, overtime hours, and work allocation, that perhaps have little to do with strategy.

Hypotheses 10, 11, and 12 were borne out, excluding the possibility that strategy or structure alone could influence performance or that a simple matching of environment and structure could do the same.

CONCLUSIONS

The findings reported here bore out many of the hypotheses. Porter's strategies displayed selective associations with most of the structural and environmental dimensions of the research. Generally, firms in the successful subsamples showed more significant relationships than unsuccessful ones. Some complementarities of strategy with environment and structure do appear to lead to good performance.

Perhaps strategies influence the complexity and the rate of change of administrative problems—first, by concentrating on industry niches having varying degrees of unpredictability and dynamism and second, by posing unique control, coordinative, and technical problems. For example, innovative differentiation involves much complexity and change, correlating with environmental dynamism, unpredictability, and the use of liaison devices and technocrats. This pattern was strongest for good performers. The situation was in many ways opposite for the strategy of cost leadership, which entails relatively little complexity and change. In fact, among successful firms, cost leadership bore a negative relationship to environmental unpredictability and dynamism and a positive one to the use of formal controls. That relationship was not found in the unsuccessful subsample. Marketing differentiation, a strategy of intermediate complexity and change, related—mainly in the successful subsample—to environmental unpredictability and dynamism; there were few relationships with structure. Finally, perhaps because it has so few implications for complexity or change, the breadth strategy related only to the use of liaison devices.

This attempt to bridge the fields of management policy and organizational theory produced results with theoretical implications. First, the findings call into question some of the descriptive notions of the traditional contingency theorists. Contrary to the contentions of Burns and Stalker (1961), Lawrence and Lorsch (1967), and Thompson (1967), strategic choice may reduce the relationships between environment and structure to insignificance.

Marketing and innovative differentiation succeed in similar environments but require very different structures. Indeed, structure and environment related more strongly to strategy than to one another. Also, the findings call into question the normative contentions of the traditional contingency theorists, as the relationships between structure and environment did not differ significantly between successful and unsuccessful groups of firms. The failure of those scholars to consider the intervening effects of strategy seems to have been a serious one.

The results also indicate the incompleteness of some of the earlier work on strategy and environment. Several researchers (Hambrick, 1985; Jauch, 1980; Miller & Friesen, 1983) have claimed, apparently correctly, that environment and strategy must be matched. But such a match is probably not enough to ensure good performance. A strategy must also be suited to the structure needed to implement it.

The results also challenge the views of Porter (1980) and others who maintain that different strategies can be used to compete quite successfully in the same industrial environment (Lenz, 1981; Miles & Snow, 1978; Porter, 1980). If environment is taken to be the whole industry of which a firm is a member, the assertion may be true. But if environment means specific target niches, with given levels of dynamism and unpredictability, the statement is questionable. The findings indicate that there are indeed significant and performance-related associations between strategy and a target environment. The environmental variables of the organizational theorists might at times have stronger relationships with strategy than have some of the industry-wide parameters of the industrial economists.

The findings seem to support Miller and Friesen's (1984) notion of gestalts. For example, changes from a differentiation strategy to one of cost leadership might profitably be accompanied by the pursuit of more stable and predictable markets, a greater emphasis on controls, and the pruning away of costly technocrats and liaison devices. In other words, strategy, structure, and environment should be closely aligned; otherwise performance may suffer.

The results also have some implications for practice. Managers and designers of organizations should, for example, pay particular attention to maintaining or building complementarities between business strategy and its structural and environmental contexts. Specifically, firms pursuing strategies of innovative and marketing differentiation may do well to seek out unpredictable and dynamic environments. Conversely, firms finding themselves in such settings might usefully adopt differentiation strategies. Companies performing complex innovation might also consider using many liaison devices and technocrats. In contrast, cost leaders should stay in predictable and stable environments and make assiduous use of sophisticated cost controls. Finally, firms with broad, unfocused strategies are most in need of liaison devices.

It is important to stress that this study was preliminary. The restriction of the sample to small, medium-sized, and undiversified firms could limit the generality of the findings. So might the cross-sectional nature of the research and the inability to establish causal directions. Finally, the geographic and cultural confinement of the study to a Francophone Canadian province, where managers may have special values and working habits (Toulouse, 1980) may be further cause to view these findings as tentative. The last limitation is, we suspect, not a very serious one. The firms studied are all situated in a North American metropolis, sell to Anglophone Canadian and United States markets, and compete against Anglophone competitors. Also, many of the responding managers were trained in North American business schools. Under such conditions, the effects of culture on the findings will probably be quite minimal, as competition induces considerable conformity (Jackson & Morgan, 1982: 92).

Subsequent researchers might do well to extend this research by using more refined taxonomies and by studying larger, more diversified, firms. It might also be useful to replicate this study using more objective PIMS-type (Schoeffler, 1977) measures of Porter's strategies (Hambrick, 1980) and environmental dimensions, such as munificence and market power, that may generate slack resources and thereby attenuate the relationships of strategy to structure and environment. Finally, there is no substitute for painstaking longitudinal analysis to explore the dynamic causal connections and performance implications of the relationships among strategy, structure, and environment. We hope this study will stimulate such research.

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APPENDIX

Environmental variables. Composite *environmental uncertainty* was measured using Miller and Droge's (1986: 557) uncertainty scales. The *unpredictability* and *dynamism* subscales used in this research respectively include items 3 and 4 and items 1, 2, and 5 of those scales. *Heterogeneity* was measured by three items gauging the differences among products or services offered in (1) customers' buying habits, (2) the nature of the competition, and (3) required methods of production or service. These were scaled 1 = about the same for all products to 7 = varies a great deal from one line to another.

Structural variables. The *delegation* scale used is that of Inkson and colleagues (1970); they called it centralization. The scales for measuring use of *technocrats, liaison devices*, and *formal controls* are from Miller (1987a: 31). For this control variable, the second and fifth items in the original scale were removed to avoid tautological relationships with the cost leadership measure.

Strategy variables. Six items measured *innovative differentiation*. The first, measuring the use of major and frequent product-service innovations, was scaled 1 = we do not use this strategy to 7 = this is a very important strategy. The second item measured annual R & D costs as a percentage of sales, standardized to range over a 7-point scale. The third item measured the percentage of sales spent on costs of initiating and implementing product-market innovations each year, standardized as was the second item. The fourth, measuring the tendency to beat competitors to market, was scaled 1 = there is a strong tendency to follow competitors in introducing new things or ideas to 7 = we always try to be ahead of competitors in product novelty or speed of innovation and usually succeed. The fifth item gauged innovative orientation and was scaled 1 = we favor the tried and true to 7 = we are growth-, innovation-, and development-oriented. The sixth measured competitive aggressiveness and was scaled 1 = we try to cooperate and coexist with competitors to 7 = we pursue a tough "undo the competitors" philosophy.

Cost of innovation was measured using only the second and third items of the innovative differentiation variable.

Marketing differentiation was measured by three items gauging (1) extensiveness of advertising, (2) use of market segmentation, and (3) use of prestige pricing. Each item was scaled 1 = we don't use this strategy to 7 = this is a very important strategy of ours.

Cost leadership was measured by eight items. The first two, measuring the use of cost centers and fixing standard costs by analyzing variances for cost control, were scaled 1 = used only rarely or for a small part of operations to 7 = used frequently or throughout the firm. The third and fourth items measured price cutting and minimization of advertising expenditures and were scaled 1 = we don't use this strategy to 7 = this is a very important strategy of ours. The fifth item measured risk proclivity and was scaled 1 = the firm has a strong proclivity for high-risk projects (with chances of very high returns) to 7 = there is a strong proclivity for low-risk projects (with normal and certain rates of return). The sixth item measured the boldness of decisions and was scaled 1 = bold, wide-ranging acts are viewed as useful and common practice to 7 = due to the nature of the environment, it is best to explore it gradually via timid, incremental behavior. The seventh and eighth items were standardized to range along 7-point scales and were subtracted from the first six items. They measured (1) R & D costs and sales and (2) initiation, development, and implementation costs of product-market innovations and sales.

Breadth was measured using three items. The first gauged the number of distinctly different product lines or services marketed (respondents were given examples) and was scaled 1 = only one to 7 = more than 10. The second item measured how differently the lines were made and was scaled 1 = very similar technologies (e.g., all produced with similar equipment) to 7 = very dissimilar (e.g., custom production for one, mass production for another). The third item measured how differently product lines were marketed and was scaled 1 = very similar in required marketing strategy, customers' needs, pricing, and so forth (e.g., one product, one market) to 7 = very dissimilar marketing strategies required (e.g,. when selling to both consumer and industrial markets).

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NEW WRINKLES IN THE THEORY OF AGE: DEMOGRAPHY, NORMS, AND PERFORMANCE RATINGS

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Age seems to play an important role in a wide range of employee behaviors. One interpretation of this role is that it depends more on people's beliefs about age than on the ages themselves. Despite the significance of this distinction for human resource planning, it has received little attention in the organizational literature. This article proposes an explanation for socially generated age effects and presents an exploratory study that used data from an electric utility.

> Looking around the basement, some of the team's brand-new members would sometimes wonder what would happen to them when they turned thirty. Being young, they could make light of the questions, and say, as one did, "When a computer engineer gets old, he gets turned out to pasture or else made into dog food."
>
> —Kidder (1981: 104)

Evaluating and comparing employee ages is an everyday pastime in organizations, insignificant in its appearance, yet significant in its results. In Kidder's (1981) account of the Data General Corporation, computer engineers observe the ages of co-workers, use their observations to assess their own career prospects, and note the absence of older engineers with discomfort. These reactions are generated not from the inherent characteristics of, but from people's responses to, chronological age. To the extent that such responses mold employee behavior, they play an important role in organizations. Indeed, people's beliefs, judgments, and notions about age appear involved in a wide range of employment issues, including hiring decisions, promotion opportunities, and employee performance (Dalton & Thompson, 1971; Kanter, 1977; Rosen & Jerdee, 1976a, 1976b, 1977; Sofer, 1970). Yet despite the significance of these employment issues, the organizational literature has given little attention to such age effects.

This article proposes that socially generated age effects result from age norms that evolve, in part, from actual age distributions within organizations. Age norms are defined here as widely shared judgments of the standard or

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typical ages of individuals holding a role or status.[1] Despite widespread belief that age distributions, age norms, and behavior are related (Riley, Johnson, & Foner, 1972), the relationships are not well understood. Previous research has provided some support for the existence of age norms in organizations (Martin & Strauss, 1956; Sofer, 1970), but the relationship between age norms and behavior remains essentially unknown (Abeles, Steel, & Wise, 1980; Edler, 1975; Marini, 1984). More extensive evidence exists for the relationship between age distributions and behavior (Elder & Rockwell, 1976; Hogan, 1981), but unfortunately, studies of age distributions have not measured age norms. And, although the literature provides theoretical support for a relationship between age distributions and age norms (Mannheim, 1928/1952; Simmel, 1950), to my knowledge this relationship has never been evaluated. The exploratory study of the socially generated effects of age presented here thus builds on earlier work by offering a more precise statement of the relationships between age distributions, age norms, and employee behavior.

THEORETICAL BACKGROUND

Normative and Demographic Approaches

There is a long tradition of investigation of the effects of age in the sociological and anthropological literatures (Atchley, 1975; Cain, 1964; Eisenstadt, 1956; Elder, 1975; Riley, 1987; Riley et al., 1972). Linton (1940, 1942) and Parsons (1942) proposed the following explanation for why such effects take place. Chronological age is one of the few universal human experiences and as a result provides a basic structural link between individuals and social systems. People use age to classify the members of a social system into categories and to match them with roles and statuses. The matching process between age categories and roles and statuses produces widely shared beliefs about the standard or typical ages of members holding each social position. Linton suggested that the shared beliefs resulting from that process are age norms that exert considerable influence on behavior. Thus, age norms produce age effects.

Studies of such age effects have typically used one of two approaches. The *normative* approach measures the relationship between age norms and behavior. In contrast, the *demographic* approach uses age distributions as a proxy for age norms. As a result, the second approach examines the relationship between age distributions and behavior rather than that between age norms and behavior. Nevertheless, both approaches divide the human life span into groups by age. In addition, both suggest that age-group membership influences behavior: people apply positive and negative social pressures on those who deviate from behaviors considered typical for an age group. In organizations, such social pressures frequently evolve around typical ages within careers that define success and identify failures. For instance, orchestra members believe their chances for moving into top-ranked orchestras decrease after they reach their early 30s (Faulkner, 1974).

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[1] Although this approach to defining age norms differs from many in that it does not include expectations, it is consistent with approaches that define norms as "frames of reference" or standardized ways of perceiving the world (Newcomb, Turner, & Converse, 1965: 229; Sherif, 1936).

The major distinction between the normative and demographic approaches lies in their measures of age-group membership. The normative approach defines age groups, also known as age grades (Radcliffe-Brown, 1929: 21), by members' shared age judgments or age estimates of others within their social system. Several studies have supported the existence of such normative age groups within organizations. Sofer's (1970) examination of two British firms uncovered shared beliefs among mid-career managers about the typical ages for career achievement. Similarly, Martin and Strauss (1956) discussed managers' shared judgments of age-related career timetables, and Kanter (1977) observed shared age-related norms that employees use in defining fast-track and plateaued workers. In a study within an occupation, Faulkner suggested that American and Canadian hockey players exhibited a clear awareness of the "short and fateful" (1974: 142) age-related testing period for major league success.

In contrast, the demographic approach defines age groups, also known as age cohorts or age strata (Riley et al., 1972), by actual age distributions. Those who take such an approach examine an actual age distribution for some role or status and use the central tendency of that distribution to define age groups. Several studies imply a relationship between such demographic age groups and socially generated age effects. Rosenbaum's (1984) longitudinal study of mobility within a large corporation showed that employees who get behind in age-based career patterns are less likely to receive future promotions. Rosenbaum (1984: 94) suggested that the high degree of ambition, anxiety, and achievement motivation evidenced by many young employees may be explained, not by their individual personalities (Maccoby, 1977) or by the characteristics of their jobs (Whyte, 1956), but by their response to the consequences of getting behind schedule. Hogan (1981) identified the typical ages for the education, first jobs, and marriages of a large sample of American men and found that men who deviated in any direction from the typical ordering of those events experienced lower total earnings and higher rates of marital disruption. Hogan speculated that age norms for the ordering of the three roles, represented in his study by demographically typical ages, produced the study's results.

Although both the normative and demographic approaches have contributed to our understanding of socially generated age effects, each has limitations. First, although a number of researchers have drawn inferences about the effects of age norms on organizational careers (cf. Faulkner, 1974; Kanter, 1977; Martin & Strauss, 1956; Sofer, 1970), they have not provided a systematic examination of normative age groups. Thus, many questions remain unanswered. For instance, what are the age boundaries of normative age groups and where do those boundaries come from? How are normative age groups matched with roles and statuses within careers? If an individual deviates from the normative age group for a role or status, then how does that deviation influence the behavior of other individuals toward him or her?

Second, although demographic measures simplify studies of age effects, the rationale underlying the approach that uses such measures is that demographic age groups represent age norms. Investigators have assumed a one-to-one correspondence between the central tendencies of an age distribution and the age norms created by employees' shared age judgments. The plausibility of that assumption depends on the accuracy of employees' judgments: when age judgments are accurate, normative and demographic age groups are identical. However, research has indicated that employees frequently misperceive organizational reality (Lawrence, 1984; Rosenbaum, 1988).

The result of this potential disparity is that demographic research may not properly account for socially generated age effects. Consider, for instance, an organization in which age distributions favor promotions for young managers. For each career level, the age distribution defines a demographic age group that identifies managers as ahead of schedule, on schedule, and behind schedule in their organizational careers. If managers perceive these demographic age groups accurately, the age norms that develop for a managerial career may encourage aspiring young managers to respond with high work involvement because they accurately perceive favorable opportunities for promotion. However, when managers perceive demographic age groups inaccurately, age effects such as work involvement may bear little relationship to the actual opportunity structure. For instance, if, despite the organizational reality, managers believe that promotions favor middle-aged managers, the norms that develop might produce the M.B.A. syndrome—young employees frustrated by the perceived slowness of promotion possibilities. In such a situation, demographic research could not easily explain the observed effects of age.

Several researchers have pointed out the limitations of the two approaches. Hogan (1981), for one, suggested that demographic age transitions for roles and statuses are not the entire picture. Age norms for transitions are important explanatory variables, but little is known about such norms. He quotes from Elder (1975): "No large sample study has provided evidence on normative expectations and sanctions regarding the timing and synchronization of social roles and transitions over the life span . . . . The process by which age norms or timetables are constructed, transmitted, and learned remains largely unexplored territory" (Hogan, 1981: 13).

Thus, the connections between demographic age patterns, age norms, and behavior are still largely unexplored. Since results from both the normative and demographic approaches have suggested that those connections are significant for human resource issues, an organizational explanation for the effects of age merits further attention.

A Proposed Explanation for Socially Generated Age Effects

The following explanation is proposed: age distributions drive the development of age norms, and age norms produce age effects. The rationale for those relationships begins with the concept of social norms. Social norms are statements by members of a social system on standards for behavior (Newcomb et al., 1965: 229; Sherif, 1936). Age-specific social norms are age norms. Members agree on the age boundaries for typical incumbents of a role or status and perceive any individual whose age violates those boundaries as deviant. Thus, age norms are widely shared judgments of the standard or typical ages of individuals holding each role or status. Homans (1950) suggested that norms evolve because people in groups develop behavioral patterns, observe them, and then agree, either explicitly or implicitly, that the patterns represent behavioral standards.

Scholars have maintained that all social systems develop age-related behavioral standards (Linton, 1936: 116–118; Murdock, 1945: 124), and the limited existing empirical evidence supports that view (Eisenstadt, 1956; Neugarten & Datan, 1973; Neugarten, Moore, & Lowe, 1965; Neugarten & Petersen, 1957; Passuth, Maines, & Neugarten, 1984). If so, it seems likely that employees observe age distributions, develop shared judgments of those distributions, and see the behavioral patterns that evolve around age as standards of behavior. Commonplace organizational gossip such as "isn't he a bit young for that job?" and "I never thought they would hire someone my age!" provide examples of how employees apply such standards in their evaluations of roles and statuses.

Explanations for why such patterns acquire meaning as behavioral standards focus on the development of normative age groups and the processes by which people distinguish "us" from "them." Work by Mannheim (1928/1952) and Ryder (1965) has suggested that normative age groups develop because individuals of similar age share comparable experiences and therefore develop like attitudes and beliefs. Within an occupational status, the central tendency of the age distribution defines a group of employees of similar age. Such employees share the experience of their life stage (cf. Gould, 1978; Levinson, 1978; Vaillant, 1977), and frequently have families at comparable stages of development. Moreover, their economic attainments afford them similar leisure activities, and, in organizations with high average tenure, they share organizational memories of "what things were like in the old days." As a result of shared experiences, employees of similar ages recognize themselves and are perceived by others as distinct groups. Thus, shared experiences define normative age groups, specify the boundaries of group membership and nonmembership, and thereby become standards of behavior.

Although the preceding discussion suggests a primary causal order for the relationships between age distributions, age norms, and employee behavior,[2] it does not imply that reciprocal relationships do not occur. In fact, age norms may influence age distributions, and employee behavior may alter age norms. For instance, over time, an age effect such as managers' ratings of employees' performance may influence the positions employees hold, thus affecting the age distribution of those positions and the norms that develop. However, the suggested causal order does mean that it would be difficult for an organization to support a change in age norms without a concomitant change in the age distribution. Reciprocal relationships are ultimately of interest to the specification of an organizational theory of age effects but are secondary and not examined here in detail.

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[2] The order is informed by the work of Rosenberg, who suggested that "research must allow for *the dominant direction of influence of variables*" (1968: 11–13). Rosenberg also suggested two factors that indicate the dominant direction: the time order and the fixity or alterability of variables. Variables that are more fixed and less malleable than others come first within a causal sequence. The time order of variables in the explanation proposed here is suggested by the rationale underlying their relationships and supported by their relative fixity. Age distributions are relatively more fixed than age norms because, after organizational turnover is controlled for, age distributions can be predicted with 100 percent accuracy.

The aerospace industry provides an example of how the primary relationships between age distributions, age norms, and employee behavior may occur and what effect they may have on organizations. During the late 1960s and early 1970s, an economic downturn resulted in fewer entry-level engineering hires within aerospace companies. This produced organizations characterized in the mid-1980s by bimodal age distributions. The TRW Corporation, for instance, has a small number of middle-aged managers relative to the numbers of young and old managers it employs.[3] Assume for the moment that companies with such age distributions promote from within and that their growth remains fairly stable. If, as was proposed, age distributions drive the development of age norms and age norms produce age effects, the following scenario may pose a potentially serious personnel problem for such firms over the next 20 years.

For many years, demographic career patterns in aerospace companies have favored promotions for middle-aged managers. However, when the current group of older managers retires, there will not be enough top-notch middle-aged managers to fill the vacancies. That fact will create a promotional demand for younger managers and dramatically decrease the average age of middle management. It seems likely that the youngest employees will observe the promotions, note the altered age distributions, and develop age-based promotional expectations that fit their observations. Thus, age norms for middle management positions will shift suddenly from the typical middle-aged manager to the typical younger manager.

Unfortunately, only the leading edge of the younger group will experience this favorable promotion environment. As soon as all the older employees retire and the positions are filled, the availability of new vacancies will slow considerably. The younger managers who received promotions will be around for quite a while; thus, actual promotion patterns will shift again in favor of middle-aged managers. It seems unlikely that the younger age norms for middle management positions will return to middle-aged norms quite as rapidly as the actual average age for the positions increases. Until employee perceptions readjust, the discrepancy will produce a situation in which promotion expectations are regularly violated. Thus, the age effect is likely to be the creation of an unusually large, disaffected group of younger employees who may respond by decreased motivation or by seeking opportunities elsewhere.

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[3] Personal communications with engineering managers and human resource staff members at the TRW Corporation provided this information.

Hypotheses

The study described in the next section examined whether the proposed relationships between age distributions, age norms, and employee behavior provide a plausible explanation for socially generated age effects. Data from an electric utility were used to examine those relationships within a managerial career. The following three hypotheses guided the empirical examination.

Managerial careers supply several advantages for studies of socially generated age effects. First, managerial careers are defined by formal status hierarchies. Position on such a hierarchy provides an explicit, unambiguous anchor for age judgments. Thus, the status of any particular career level in relation to other career levels has strong convergent and nomological validity (cf. Bagozzi, 1980) for organizational members. Second, since an individual can occupy only one level at a time, formal advancement is inevitably associated with the age of the individual. That association makes it likely that employees use age to differentiate between career levels and therefore that age norms develop.

The first question to be answered was whether managerial careers within a work organization are age graded; that is, have employees developed shared perceptions of typical ages that differ across career levels? An organizational career is age graded only when normative age groups, defined by employees' shared judgments of typical ages, distinguish between levels. In an age-graded organization, employees agree that the age groups associated with each career level are distinct. In an organization undifferentiated by age, employees agree that a manager's age is unrelated to career level. Thus,

> *Hypothesis 1: Normative age groups differ across career levels.*

If age grading exists, the second question is whether employees perceive demographic age groups accurately. As discussed in the theoretical section, the assumption supporting the use of demographic age groups to predict behavior is that employees' age judgments are accurate and that age norms therefore map directly onto actual age distributions. If that is true, employees' shared judgments of what is typical for each career level should cluster randomly around the actual typical age. Thus,

> *Hypothesis 2: Normative and demographic age groups for each career level are identical.*

Although Hypothesis 2 addresses whether misperceptions occur, it does not address why they occur. This study was not designed to test various explanations for misperceptions; however, I explored the pattern of judgment errors to assess whether they appeared random or systematic. Differences that appeared random would offer little justification for the proposed relationship between age distributions and age judgments. Differences that appeared systematic might indicate what direction future studies should take in examining the association between age distributions and age judgments.[4]

The final question was whether managers' membership in or deviation from the age groups associated with their career level influences the behavior of other employees toward them. This study examined the association between age groups and managers' performance ratings of managerial subordinates. Individuals whom managers perceive as young for their position, the "fast-trackers" or "water walkers," are generally viewed with higher regard than those who are seen as old (Kanter, 1977). Thus,

> *Hypothesis 3: There is a significant relationship between normative age group deviation and performance ratings. Specifically, when compared with the number of high performance ratings managers give to randomly selected managerial subordinates:*
>
> *a) Managers' performance ratings of managerial subordinates are more likely to be high when managerial subordinates are younger than the normative ages for their career level.*
>
> *b) Managers' performance ratings of managerial subordinates are less likely to be high when managerial subordinates are older than the normative ages for their career level.*
>
> *c) Managers' performance ratings of managerial subordinates are equally likely to be high when managerial subordinates are members of the normative age group for their career level.*

The explanation underlying this study suggests that a relationship between demographic age groups and performance ratings should be observed only to the extent that demographic and normative age groups are similar. If demographic and normative age groups are identical (Hypothesis 2), each should exhibit the same association with performance ratings. However, if demographic and normative age groups differ, the association between normative age groups and performance ratings should be greater than the association between demographic age groups and performance ratings. This pattern should occur because, as I proposed, shared beliefs about standard or typical ages rather than actual standard or typical ages influence managers' performance ratings. However, if demographic age groups appear systematically related to normative age groups, the associations of demographic and normative age groups with performance ratings should exhibit a similar direction, even if the magnitude of the association differs.

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[4] For instance, decision theory suggests that, when faced with an uncertain distribution, people tend to overestimate its lower boundary and underestimate its upper boundary, thus producing a systematic regression towards the mean (Lichtenstein, Fischoff, & Phillips, 1982). Observing such a systematic pattern raises additional questions. Does the pattern occur in all organizations, or does it only occur in organizations in which employees perceive the distribution as uncertain? Under what conditions does an organization's age distribution appear uncertain to employees? If scholars can understand how employees make judgments, perhaps we can anticipate what organizational characteristics are likely to produce what patterns of age norms.

METHODS

Data

Demographic and questionnaire data on managerial careers were collected from an electric utility. The Bennix Power Company (not its real name) is an old, established firm. Traditionally, people come to work in the company after finishing their schooling and remain until retirement. The average age of managerial employees is 48 years (range = 25–66), the average tenure is 24 years (range = 0–44), and the correlation between age and tenure is .78. The company's formal management hierarchy includes eight career levels: level 1 is a first-level supervisory position and level 8 includes the chief executive officer and the president. Managerial vacancies are filled internally, and advancement is a slow process. Employees have ample opportunity, therefore, to develop shared and accurate judgments of the age distribution.

The questionnaire was developed in several stages. After preliminary development, ten individuals from an executive education class who were selected for their diverse backgrounds were interviewed about specific questionnaire items and their experiences with age-related work issues. Each interview lasted one and a half to three hours. A revised version of the questionnaire was then pretested with the entire class ($N = 36$), and further revisions were made on the basis of this feedback. After the company's management agreed to participate in the project, I spent three months in the organization. My purpose was to tailor the questionnaire to the organization and to solicit additional questions of interest to its management. Discussions that included several half-day meetings were held with members of the human resources staff. In addition, I conducted four formal interviews of one and a half to three hours each with employees of varying ages, career levels, genders, and functional areas. Each of these employees completed a copy of the questionnaire before being interviewed.

After these discussions and subsequent questionnaire revisions had occurred, the company approved the questionnaire for distribution. Questionnaires were distributed through company mail, and the company permitted one follow-up memorandum. Sixty-six percent ($N = 390$) of all managers returned the questionnaire. Questionnaire data were checked carefully for coding errors. An independent comparison of the final data set against the original questionnaires by two coders indicated that the error rate was negligible (< 0.07%). Demographic data and the company's employee performance ratings were obtained for all managers ($N = 593$).

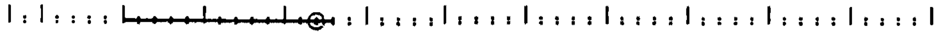
Sampling bias was examined by comparing demographic characteristics of the managers who completed the questionnaire and of the population of managers. Respondents were representative of the population in career level, functional area, and gender. Response levels fluctuated by age and tenure, with the distribution of responses biased towards younger managers who had been in the company fewer years. Other comparisons were not possible because the questionnaires were answered anonymously; however, further examination of the data suggested that the age and tenure biases should not affect the results. First, neither age nor tenure is related strongly to age judgments (Lawrence, 1985). Second, tenure appears to exert no effect on age judgments independent of age. The high correlation between age and tenure prohibited a linear decomposition of age and tenure effects, so a Wilcoxon signed-ranks test was used to see whether newcomers and oldtimers viewed the organization any differently. I matched 13 employee pairs (N = 26) on age, gender, functional area, and career level. One group comprised individuals who had been with the company for 2 years or less, and the other, individuals who had been with the company for 15 years or more. The results showed no significant difference between the two groups on any of the 24 age judgments assessed in this study. Thus, although it remains possible that sampling bias affected the results, it seems unlikely.

Measures

Age judgments. Respondents' judgments of the ages of managers in each career level were used to assess normative age groups. Age norms do not exist without such judgments because standards for age-typical behavior cannot be enforced without wide agreement on the typical ages. For each career level in the organization, the questionnaire asked managers' judgments of (1) the typical age of individuals in that level and (2) the age range of individuals in that level. Actual company titles for each career level were used. In the example shown in Figure 1, the respondent indicates that he believes the typical age of supervisors is 37 and that supervisors range in age from 25 to 38 years old.[5]

FIGURE 1
Questionnaire Item Requesting Respondents' Age Judgments

1. At Bennix Power Company, my perception is that supervisors are:



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[5] The visual age scale allowed people to be flexible in answering questions. Pretesting indicated that people will come up with a numerical age if forced to do so; however, they find it easier to respond to a visual picture of an entire age range. Whether the two methods would have elicited different responses is unknown. Additional study on the reliability and validity of different methods of obtaining age judgments is necessary.

This study follows Homans' (1950) description of normative inference, in which standards of behavior are inferred from what people say is typical (cf. Labovitz & Hagedorn, 1973). The disadvantage of normative inference is that it does not assess directly whether subjects perceive their judgments of typical behaviors to be standards. However, direct questions concerning behavioral standards assume that people are equally aware of what behaviors are typical and what behaviors are atypical. On the basis of the preliminary interviews and questionnaire pretesting, that assumption appeared unwarranted for age. People are much better at describing the actual typical age for an activity than they are at discussing what is atypical. The social norms around age seem deeply embedded within everyday life: when asked about atypical ages, people often treat the question as absurd.[6] For that reason, respondents' age judgments of typical managers were used to define normative age groups.

Normative age groups. Age norms were defined earlier as widely shared beliefs about the standard or typical ages of individuals holding roles or statuses. The set of ages that defines the standard or typical ages for any role or status is its normative age group. There are two issues in defining normative age groups from a distribution of age judgments. One is deciding how to select the age boundaries. The other is deciding how much agreement there must be before judgments are said to be shared. This study followed Kluckhohn, who suggested that "the best conceptual model of the culture can only state correctly the central tendencies and ranges of variation" in a distribution (1951: 76).

The normative age group for each career level was defined as the age range circumscribing the central tendency in the distribution of typical age judgments. I selected age-group boundaries using the youngest and oldest ages that received at least 10 percent ($N = 39$) of the responses. Those age-group boundaries seem likely to be multiples of five because census reports in many countries show that people characteristically report ages that end in 0 and 5 (Shyrock, Siegel, & associates, 1980: 204). If that occurred for respondents' judgments, using means and standard deviations to define age-group boundaries might have failed to capture an important component of what managers judged to be typical.

Following Jacobsen and Van Der Voordt (1980), I considered managers' age judgments to be widely shared when the level of agreement delineated a *representative norm*, "the relative frequency of the modal category being so great that it represents the population's response for most intents and purposes" (1980: 473). For the Bennix Power Company, that level of agreement was reached when 66.6 percent of the respondents agreed on the normative age group for a career level.[7]

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[6] I once asked a 45-year-old defense industry manager whether there were any standard ages within his company for middle-level managers. His reply was "Of course not. We promote the best people available." I then asked whether he would hire a 25-year-old individual in his middle-level job. This time he said, "Let's not be ridiculous." Although his response appeared reasonable to him, in some companies, for instance, start-up electronics firms, a 25-year-old middle manager would not be at all out of place. The point is that this manager was so unaware of his own age standards that he could not discuss a question concerning standard ages unless confronted with ages that grossly violated his expectations.

Demographic age groups. Demographic age groups were defined by the age range one standard deviation around the mean age of the population for each career level. I used the standard deviation to define demographic age group boundaries because it provides a generally accepted measure of central tendency.

Performance ratings. Managers' performance ratings for all managerial subordinates were obtained for the population of the company's managers who had received performance ratings the year the questionnaire was distributed ($N = 542$). All managers in levels 2 through 8 rate subordinate managers. Bennix's performance ratings range from unacceptable (0) to excellent (5). Most managers receive good (3) ratings ($N = 305$, 56.3%), suggesting this category can be interpreted as including competent but not outstanding individuals. I considered the managers whose ratings were above ($N = 161$, 29.7%) or below ($N = 76$, 14.0%) those of that group as the high and low performers at the company.

RESULTS

The top part of Table 1 shows the means, standard deviations, and ranges of age judgments for the eight career levels. All eight levels exhibited considerable variation in age judgments. An analysis reported elsewhere (Lawrence, 1985) has indicated that only a small portion of the variation in age judgments can be attributed to a respondent's age, organizational tenure, career level, or education.

Figure 2 shows the frequency distribution for level 1. The remaining seven distributions exhibit a similar pattern.[8] Two interesting characteristics of the frequency distributions should be noted. First, as expected, respondents tended to specify ages that are multiples of five. On the average, 55 percent of the typical age judgments for each career level fell in that category. Thus, the managers studied tended to treat the interval age scale as an 11-step ordinal item and did not distinguish between ages less than five years apart. This results in peaks in the frequency distributions that have more to do with how people interpret questions about age than with the essential characteristics of the distribution.

When the distinction between ordinal and interval interpretations of the age scale are taken into account, the second salient characteristic of the

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[7] The 66.6 percent level of agreement was computed using Jacobsen and Van Der Voordt's guidelines for assessing widely shared social norms using modal frequencies. The following equation specifies the requisite level of agreement for a given study: $pk_{1rep} = \frac{1}{2}(1 + \frac{1}{K})$, where pk_{1rep} is the level of agreement required for a representative norm and K equals the number of response categories. In the firm studied, there are three response categories for each career level because an employee's age judgment can fall either within, ahead, or behind the range of normative ages. Thus, $pk_{1rep} = \frac{1}{2}(1 + \frac{1}{3}) = 66.6\%$.

[8] Age judgment and actual age distributions for each level are available from the author.

TABLE 1
Perceived and Actual Ages for the Managerial Career at the Company Studied

(a) Age Judgments[a]

Career Level	Typical Age			Youngest Age			Oldest Age		
	Means	s.d.	Ranges	Means	s.d.	Ranges	Means	s.d.	Ranges
1. Supervisor	40.4	6.1	28–57	32.4	5.9	20–52	51.7	9.2	34–68
2. Senior supervisor	44.8	6.1	30–60	37.6	6.2	20–55	54.3	7.9	35–68
3. Division head	47.9	5.7	33–60	40.4	6.5	25–55	57.1	7.1	35–68
4. Assistant department head	49.5	5.4	35–61	42.1	5.8	28–56	57.6	6.2	39–68
5. Department head	50.7	4.8	35–62	43.2	6.1	30–61	59.0	5.3	42–69
6. Vice president	53.9	3.6	44–63	47.5	4.3	35–61	61.1	3.7	49–70
7. Senior vice president	56.4	3.2	45–65	51.0	3.7	40–61	62.2	3.0	49–70
8. President and CEO	60.5	2.5	50–75	56.9	3.8	45–64	63.9	2.2	55–74

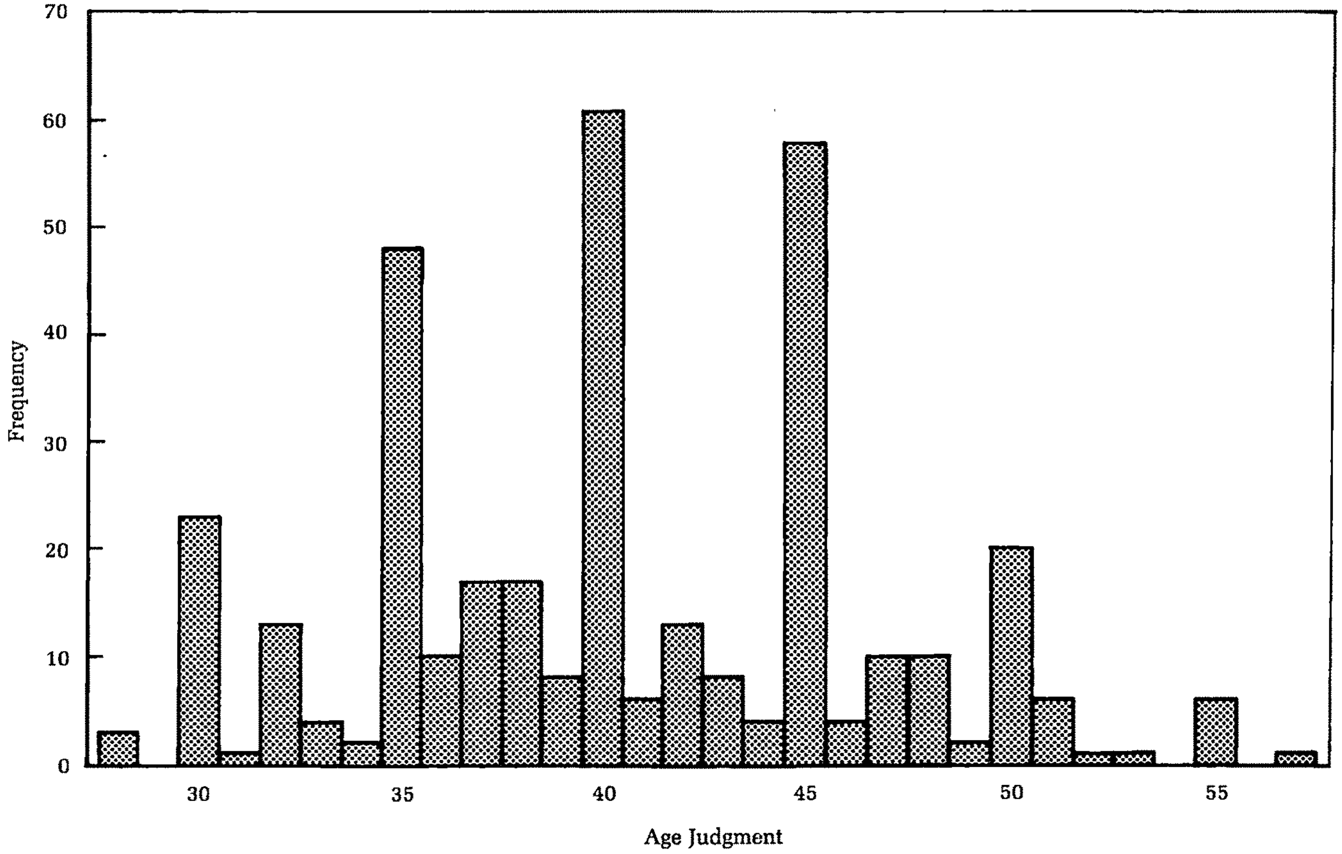
(b) Actual Ages[b]

Career Level	Medians	Modes	μ	σ	Ranges	N
1. Supervisor	48.0	47	47.2	8.9	25–66	287
2. Senior supervisor	49.0	48	48.1	8.1	30–64	139
3. Division head	50.0	57	49.6	9.3	28–65	96
4. Assistant department head	52.5	57	49.8	9.4	31–62	24
5. Department head	49.0	54	49.2	8.5	33–65	31
6. Vice president	52.0	53	51.1	6.1	40–61	10
7. Senior vice president	53.5	52	54.3	2.9	52–58	4
8. President and CEO	61.5	61	61.5	0.7	61–62	2

[a] Results are for a group of 390 respondents.

[b] Results are for a population of 593 managers.

FIGURE 2
Frequency Distribution for Typical Age Judgments, Career Level 1



distributions that emerged is that they are basically unimodal. For every career level, all ages that received more than 10 percent of the responses occurred at adjacent five-year intervals. Moreover, with few exceptions, the fraction of responses between those ages is higher than the fraction of responses between other five-year age intervals. Thus, the distributions are unimodal, both for the ages that are multiples of five and for those that are not. This pattern suggests that respondents agreed that a single age group represented what is typical for each level. An alternate finding might have been a bimodal or multimodal distribution, indicating that some people believed one age group was typical and others believed a different age group was typical. This result is important because it permits the specification of a single normative age group for each career level.

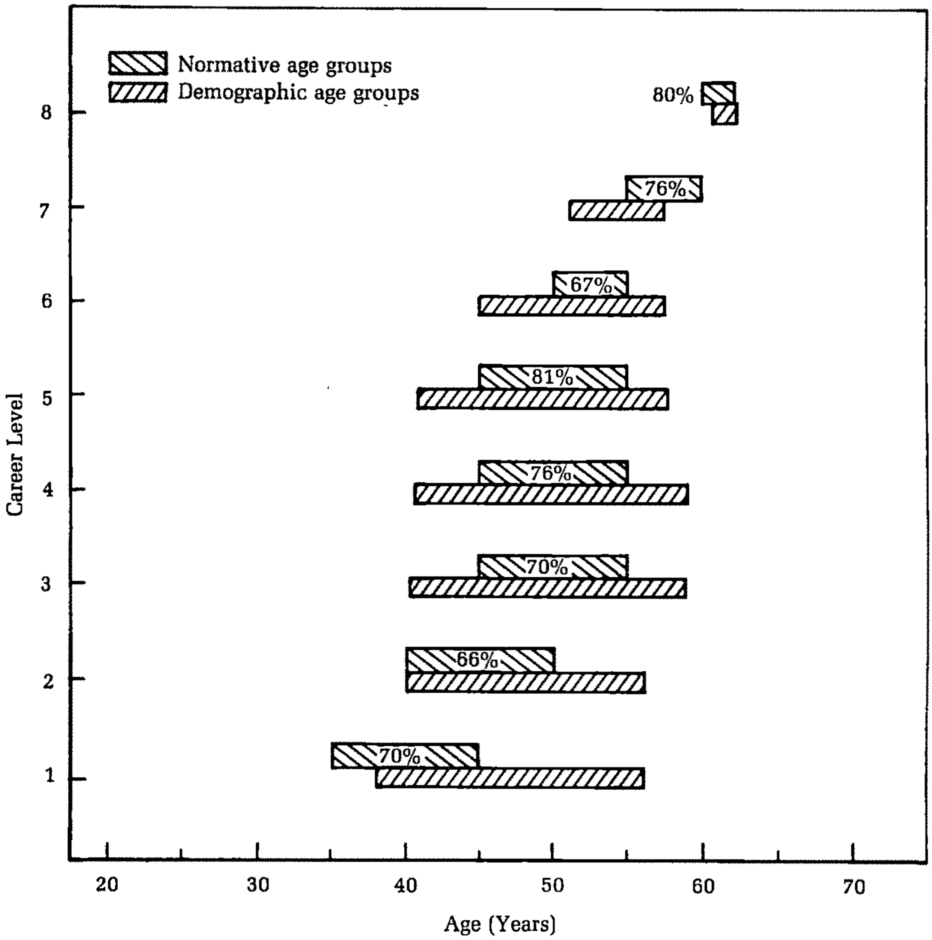
The lower part of Table 1 summarizes the actual age distributions for all career levels. The youngest manager in the company was 25 and the oldest manager was 66. The age range of managers was large in each of the first five levels but decreased dramatically in levels 6 through 8. The decrease reflected the increasing ages of the youngest managers in the higher career levels. Although the ages of managers in levels 1 through 3 were somewhat normally distributed, the age distributions of levels 4 through 8 were fairly flat.

Figure 3 shows the normative and demographic age groups defined for each of the eight career levels. The specification of age groups for level 1 provides an example of the definition process. The normative age group for level 1 is the age range defined by the youngest and oldest ages that received 10 percent of the responses. Figure 2 shows that responses on the ages 35, 40, and 45 exceeded 10 percent of the total responses (13%, 17%, and 16%). The ages between 35 and 40 accounted for 15 percent of the total responses, and the ages between 40 and 45 accounted for 9 percent. The next closest candidate for inclusion as a normative age group boundary is age 30. However, responses on this age and the ages between 30 and 35 occurred much less frequently. The fraction of responses on age 30 was 6 percent, and the fraction of responses between 30 and 35 was also 6 percent. Seventy percent of all respondents believed the typical age of level 1 managers to be between 35 and 45. Thus, I selected 35 and 45 as the normative age group boundaries for this career level.

On the average, 73 percent of all respondents agreed on the normative age groups for each career level (range = 66–81%). Thus, with the exception of level 2, which just misses the suggested 66.6 percent cutoff, the level of managers' agreement on age judgments suggests these normative age groups delineate representative norms (Jacobsen & Van Der Voordt, 1980).

The demographic age group for level 1 is defined by the age range one standard deviation around the mean age. The mean age for level 1 is 47.2, and the standard deviation is 8.9. Thus, 38.3 and 56.1 are the demographic age group boundaries for this career level.

FIGURE 3
Comparison of Normative and Demographic Age Groups[a]



[a] The numbers within the bars defining normative age groups indicate the fraction of total responses falling within the given age range.

The Existence of Age Grading

Hypothesis 1 states that normative age groups differ across career levels. Figure 3 shows the comparison of normative age groups across the eight career levels. Although several normative age groups overlap, there are four mutually disjoint age categories: 35–45, 45–55, 55–60, and 60–62. Typical managers in level 1, levels 3–5, level 7, and level 8 are seen as different in age from one another; thus, the managerial career appears to be age graded.

This aggregate analysis of judgments obscures individual response patterns; it is possible, given the large variation in responses for each level, that most individual respondents did not see age differences between career levels. To take an extreme example, suppose that the typical age judgments for level 1 are uniformly distributed between the ages of 20 and 25 and that those for level 2 are uniformly distributed between 21 and 26. It may be that all respondents saw a one-year difference between the typical ages in levels 1 and 2. But it could also be that 80 percent of the respondents saw no difference and 20 percent saw a six-year difference between the typical ages in those levels. To test this possibility, I used a multivariate repeated measures test (Morrison, 1976: 141–150). The null hypothesis was that, on the average, each respondent saw no age differences between the eight career levels.

The results did not support the null hypothesis ($F_{7,332} = 984.50$; $p < .001$). Individual respondents did not think the typical age for managers was the same in all eight levels. Given that result, I computed simultaneous confidence intervals for the differences between adjacent levels to determine which career levels differed. The results showed that respondents saw managers in all adjacent career levels as differing in age. Thus, the aggregated judgments defining normative age groups do not obscure individual judgments of no age differences between career levels. If anything, aggregated judgments obscure the extent to which individuals do age grade the managerial career.

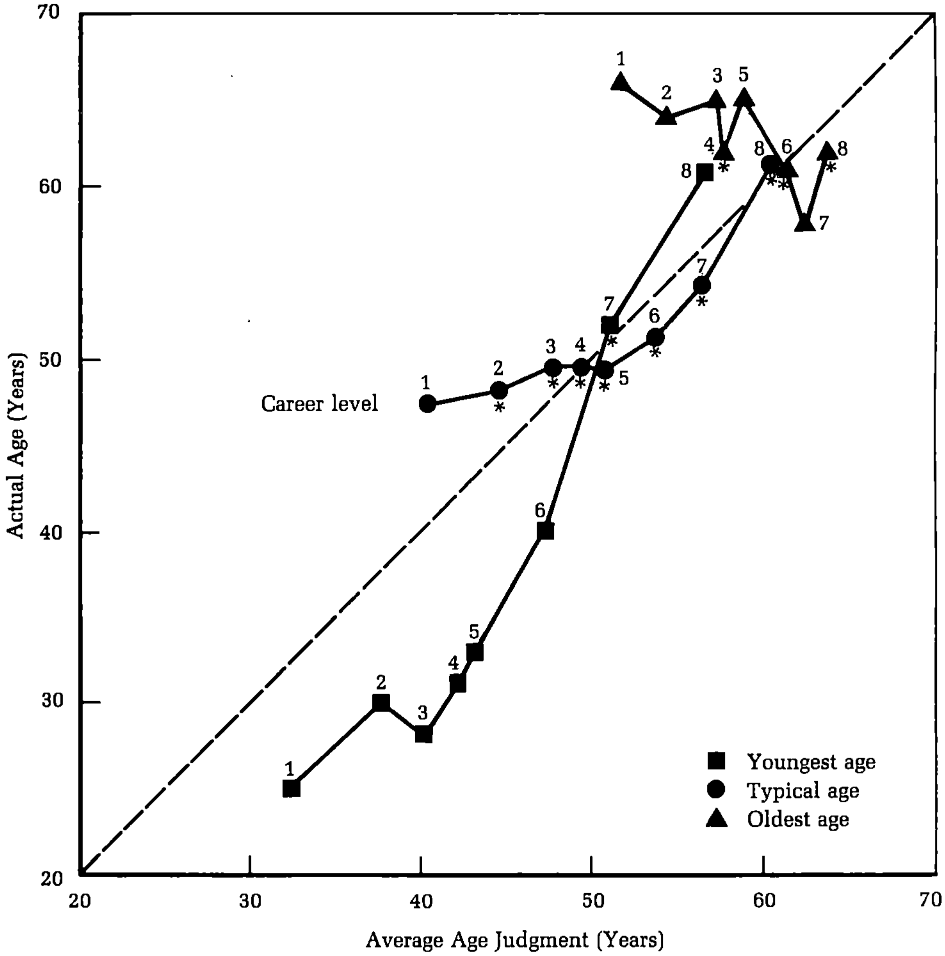
Comparison of Normative and Demographic Age Groups

Hypothesis 2 states that normative and demographic age groups for each career level are identical. Figure 3 shows the comparison of normative and demographic age groups for each career level. The groups overlap but are not identical. A comparison of the distributions underlying the two age groups corroborated the significance of their differences. If normative and demographic age groups are similar, typical age judgments should be randomly distributed around the median age for each level. Results of a binominal test (Snedecor & Cochran, 1980: 96–97) failed to support the similarity hypothesis at the .05 level for all eight levels. Respondents' judgments of age groups do not match demographic age categories; thus, managers appear to misperceive the actual distribution of age in their organization.

Although these results disconfirmed the equality assumption, normative and demographic age groups may still have been related. Thus, it was important to explore whether their differences were random or systematic. A comparison of the two sets of age groups suggested a systematic relationship. Normative and demographic age groups for each level overlap. In addition, with the exception of level 8, normative age groups constrain the range of typical ages further than the actual distribution indicates. Although normative age groups are defined by aggregated judgments, the results are consistent with the regression phenomenon observed in individual decision making. As discussed earlier, people tend to tighten boundaries when making judgments of uncertain distributions (Lichtenstein et al., 1982).

To confirm whether the regression observed at the aggregate level reflects a similar phenomenon at the individual level, average judgments for the typical as well as the youngest and oldest managers were compared with the actual ages for each level. Figure 4 shows this comparison. One set of points represents the actual youngest age compared to the average youngest age judgment, another set represents the actual oldest age compared to the average oldest age judgment, and a third set represents the actual average age

FIGURE 4
Comparison of Actual Ages with Age Judgments[a]



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[a] For those levels marked underneath by an asterisk, the actual age falls within one standard deviation of the average age judgment.

compared to the average typical age judgment. When the average age judgment is accurate, points fall on the identity line. Because there is variation in judgments, a second measure of accuracy is whether the actual age is within the range of most age judgments. Career levels for which the actual age is within one standard deviation of the average judgment are indicated by an asterisk underneath the symbol.

The results of the comparison support the existence of a systematic regression in respondents' judgments at the individual level. As expected, on the average, respondents consistently overestimated the youngest age and underestimated the oldest age for each level. Judgments of average typical ages were reasonably accurate compared with judgments of the youngest and oldest ages. However, the regression observed for the extreme ages suggests that this phenomenon may explain the tightness of typical age judgment distributions that define normative age group boundaries.

The availability of information on which judgments are made may explain the relative accuracy of judgments about typical ages. People recall frequent events more easily than infrequent events (Tversky & Kahneman, 1973, 1974). In this organizational context, managers may make judgments on the basis of whom they see, and they see the typical manager more often than they see the youngest or the oldest manager. That explanation does not account for the increasing accuracy of the youngest and oldest age judgments for the upper career levels. The actual age distributions of the upper career levels are almost flat, suggesting that there is no typical age for these high-level managers. People may make better judgments concerning them because they are highly visible and few in number.

The results presented here suggest that managers may employ decision heuristics when making judgments about a company's age distribution. Given that shared judgments define normative age groups, such an interpretation is not inconsistent with the explanation that age norms evolve from actual distributions. Although normative and demographic age groups are not identical in this organization, they appear related systematically through judgment processes.

The Relationship Between Age Groups and Performance Ratings

Since the results did not support Hypothesis 2, Hypotheses 3a–3c were examined for both normative and demographic age groups. Those hypotheses specify the expected relationships between age-group membership and performance ratings. Figure 3 shows the normative and demographic age groups defined for each career level in the organization. These age-group definitions were used to divide the population of the firm's managers who received performance ratings ($N = 542$) into *ahead-of-schedule*, *on-schedule*, and *behind-schedule* categories. For example, applying normative age groups, I assigned all level 1 managers younger than 35 years of age to the ahead-of-schedule category, as well as level 2 managers younger than 40, level 3 managers younger than 45, and so forth through the eight levels. The same procedure was used to divide the population using demographic age groups.[9]

The test of Hypothesis 3 is whether the proportion of managers receiving high performance ratings in each of the ahead-of-schedule, behind-schedule, and on-schedule categories differs from what is expected for the population. The proportion of managers receiving high performance ratings in the population is 29.7 percent, so the expected frequency for each category is 29.7 percent of the frequency of respondents in that category. Observed and expected frequencies were compared using a chi-square goodness-of-fit test.

Table 2 summarizes the results of those tests. For normative age groups, the results support Hypotheses 3a–3c. The numbers of managers receiving high performance ratings in both the ahead-of-schedule and behind-schedule categories are significantly different from what would be expected. The number of high performance ratings in the ahead-of-schedule category is significantly higher than expected and the number of high performance ratings in the behind-schedule category is significantly lower than expected. The number of managers receiving high performance ratings in the on-schedule category does not differ significantly from the number in the population.

The results for the demographic age groups are quite different. Although the results support Hypothesis 3c, they support neither Hypothesis 3a nor 3b. None of the on- or off-schedule categories discriminate the number of managers receiving high performance ratings from what is expected within the population at the .05 level.

Both normative and demographic age groups appear similarly related to managers' performance ratings. However, the relationship between age-group deviation and performance ratings is significant for normative age groups, whereas this relationship is not significant for demographic age groups. If researchers taking the demographic approach had examined age groupings in the Bennix Power Company using only these demographic specifications, they would have observed no significant relationship between managerial subordinates' age-group membership and performance ratings by supervisory managers. This finding supports the importance of studying both employees' judgments and actual age distributions in studies of socially generated age effects.

An important alternate explanation for these findings is that the probability of receiving a high performance rating is positively related with youth (Rosen & Jerdee, 1976a, 1977). Managers in the ahead-of-schedule category

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[9] Only managers in levels 2 through 8 gave performance ratings of managerial subordinates; therefore, before I examined the relationship between age groups and performance it was important to confirm that those managers' view of normative age groups was similar to that of the aggregate group of managers. The data show that it is. Normative age groups for managers in levels 2 through 8 are identical to the normative age groups for the aggregate group of managers. Further, the level of agreement on each career level for managers in levels 2 through 8 lies within four percentage points of the aggregate levels shown in Figure 3 (average difference = 1.8, range = 0–4). In all cases, the proportion of managers in levels 2 through 8 who agree on the normative age group exceeds the 66.6 percent cutoff.

TABLE 2
Frequencies of Managers Receiving Various Performance Ratings

Schedule Categories[a]	Observed	Expected[b]	χ^{2c}
(a) Normative Age Groups			
Ahead-of-schedule			
High performance ratings	34	24.35	
Low-to-average performance ratings	48	57.65	
Total	82	82.00	5.44*
On-schedule			
High performance ratings	65	55.24	
Low-to-average performance ratings	121	130.76	
Total	186	186.00	2.45
Behind-schedule			
High performance ratings	62	81.38	
Low-to-average performance ratings	212	192.62	
Total	274	274.00	6.57*
(b) Demographic Age Groups			
Ahead-of-schedule			
High performance ratings	31	23.46	
Low-to-average performance ratings	48	55.54	
Total	79	79.00	3.44
On-schedule			
High performance ratings	113	114.05	
Low-to-average performance ratings	271	269.95	
Total	384	384.00	0.01
Behind-schedule			
High performance ratings	17	23.46	
Low-to-average performance ratings	62	55.54	
Total	79	79.00	3.44

[a] The age-group definitions were used to divide the populations of managers who received performance ratings into the categories indicated.

[b] The expected frequency equals .297(*N*), where .297 is the proportion of managers receiving high performance ratings in the population and *N* is the number of respondents in the category.

[c] $df = 1$.

*$p < .05$

may receive higher performance ratings because they are younger than other managers, and younger managers receive higher ratings, regardless of age-group membership. .

To examine this possibility, the relationship between age and performance was studied. Although the correlation between these two variables is not significant ($r = -.04$, $p = .35$), further examination revealed they have a curvilinear relationship. The proportion of managers receiving high performance ratings is lowest among young (20–30) and old (63+) managers. It is highest among managers between the ages of 31 and 40. After 40, the proportion of managers receiving high performance ratings declines somewhat but remains relatively stable through age 62. I used these characteristics of the performance distribution to divide managers into four age cohorts: 20–30, 31–40, 41–62, and over 62. If age explains performance ratings independently of age-group membership, there should be no difference between the proportion of high performance ratings in each on- and off-schedule category. The findings summarized in Table 3 show that is not the case.

In all instances where there is a comparison age cohort, ahead-of-schedule managers are more likely to receive high performance ratings than on-schedule managers, and on-schedule managers are more likely to receive high performance ratings than behind-schedule managers. For the normatively defined categories, 48 percent of the ahead-of-schedule managers in the top-performance 31–40 year-old age cohort received high performance ratings, whereas only 33 percent of the on-schedule managers in this cohort received high performance ratings. Similarly, 42 percent of the ahead-of-schedule managers in the moderate-performance 41–62 year-old age cohort received high performance ratings, whereas only 35 percent of the on-schedule managers and 24 percent of the behind-schedule managers in this age cohort did so. The same pattern of results emerged for the demographically defined categories. Age-group membership appears related to managers' performance ratings, regardless of the subordinate's age.

TABLE 3
Proportions of Managers Receiving High Performance Ratings in Schedule Categories[a] by Age Cohort

	Age Cohorts[b]									
	20–30		31–40		41–62		≥63		Total	
Schedule Categories	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*
(a) Normative Age Groups										
Ahead-of-schedule	14	14	48	56	42	12			41	82
On-schedule			33	24	35	162			35	186
Behind-schedule					24	257	6	17	23	274
(b) Demographic Age Groups										
Ahead-of-schedule	14	14	45	65					39	79
On-schedule			40	15	29	369			29	384
Behind-schedule					26	62	6	17	22	79

[a] The age-group definitions were used to divide the population of managers into the categories indicated.

[b] The column headed % gives the proportion of managers receiving high performance ratings. The column headed *N* gives the total number of managers receiving performance ratings.

DISCUSSION AND IMPLICATIONS

The goal of this exploratory study was to examine an explanation for socially generated age effects. The results support the plausibility of that explanation—age distributions appear distinct from, but related to, age norms, and deviation from age norms is associated with performance ratings. Further, the relationship between managers' deviations from the typical ages of the age distribution for their positions and the performance ratings they receive is not significant, whereas the comparable relationship for age norms is. The direction of the two relationships, however, is similar. These findings are not inconsistent with the interpretation that age distributions and age norms are related systematically. Moreover, these findings are consistent with the interpretation that managers respond to shared beliefs about age rather than to actual ages.

Several limitations should be noted in interpreting the results. Bennix Power Company is only one organization, and we do not know how these age-related phenomena will generalize to other organizations. Preliminary interviews conducted before this research took place suggest that age judgments of career progress depend on organizational characteristics such as industry, size, age, and rate of growth. That dependence is not surprising, given that age distributions differ by occupation (Kaufman & Spilerman, 1982; Miles, 1935: 658–664; Smith, 1973). It seems likely that age grading differs in other organizations, even if the processes linking age and employee behavior remain the same. Moreover, if widely shared judgments depend on a stable organizational context such as the one studied here, it is possible that employees in organizations with high turnover or fluctuating career hierarchies do not develop such widely shared judgments and thus that age norms are either weak or nonexistent.

In addition, the data are cross-sectional. Although the explanation suggests the direction of the relationships between age distributions, age norms, and individual behavior, this research did not provide evidence on their causal order. It is not possible with cross-sectional data to state whether age-group deviation causes differences in managers' performance ratings or whether managers' performance ratings lead to changes in perceptions of typical ages and hence, age-group deviation. It is possible that both occur. The observed relationships may result from managerial decisions that become institutionalized over time and thus serve to create and reinforce the meaning of age norms. For instance, if a manager is promoted when he or she is young in terms of the current age norms for a career level, other managers in the organization may see the promotion as a signal of the promoted individual's ability (Forbes, 1987; Rosenbaum, 1988). Once defined as a high-performance employee, the manager may have an increased probability of future promotions at an early age. This process reinforces existing age norms and increases the likelihood of observing performance differences for ahead-of-schedule employees.

Further, although the exploratory findings showing a systematic relationship between age distributions and age judgments suggest decision heuristics at work, other explanations for the association between age distributions and age judgments should be examined. For instance, it is well known that majority opinion influences the judgments of individuals, even when majority opinion is inaccurate (Asch, 1951). As a result, if a young employee associates with older managers who still think of the organization as it was in "the good old days," the young manager's age judgments may be influenced by the groups' perceptions. It is also possible that misperceptions occur because employees' age judgments do not adjust rapidly when an organization's age distribution changes. Related work on social comparison processes (e.g., Singer, E., 1981; Singer, J.E., 1980) suggests that misperceptions may occur because of the salience of career success to employees. For instance, an employee who cares a great deal about promotion may watch fast-track managers carefully; thus, the ages of fast-trackers may influence the employee's judgments.

Finally, the meaning of the relationship between age groups and performance remains in question. Managers appear to use their subordinates' age-group membership as an implicit evaluation criterion. Yet being off schedule may have little to do with performance. Highly respected managers may choose a slower performance route even when given the opportunity to move ahead (Bailyn, 1979). As a result, it is unknown whether the differences in performance ratings observed in this study indicate perceived or actual differences in performance. However, it seems likely that such evaluations, even if originally inaccurate, become accurate over time through a social form of self-fulfilling prophecy. The process through which age norms influence behavior remains an area for further investigation.

The findings do suggest that the "unexplored territory" (Elder, 1975: 176; Hogan, 1981: 13) connecting age distributions, age norms, and employee behavior is fertile ground, not only for elaborating an explanation for age effects, but also for understanding career systems within organizations. First, shared perceptions of typical ages may indicate employees' perceptions of potential mobility. For instance, respondents believed that only level 1 managers were typically younger than 40 and that only level 7 and 8 managers were typically older than 55. Those boundaries suggest that respondents believed almost all upward movement occurred between the two ages. Forty is the age at which people begin to move to level 2, and 55 is the make-or-break age for promotion to the highest levels, a move most managers never make. Thus, in an organization where employees often remain their entire working lives, about 45 years, managers see themselves as upwardly mobile during only 15 years. Longitudinal data are not available from this company, but these perceptions are consistent with findings from Rosenbaum's (1979a, 1979b, 1984) study of a large corporation, in which the period of high career mobility was limited to a rather short timespan.

Second, age grading may play a role in demographic theories of promotion probabilities. If managers base evaluation and promotion decisions on what they currently believe is typical for a particular level, such shared age judgments may provide the link between structural and individual explanations of mobility. Stewman and Konda (1983), for example, examined demographically determined promotion probabilities in organizations. Their focus was structural, but they stated that promotions are conditional on managerial preferences. The results presented in this study suggest that such preferences may be guided by age-graded judgments of whether subordinates are ahead of, on, or behind schedule for their career level, because managers may use such judgments as signals of a subordinate's future potential.

Third, in addition to constructing a picture of what is typical in each level, employees may also use age to project the promotion pattern between levels, thus creating a cognitive representation of an entire career. The age judgments in this study suggest several characteristics of such a shared cognitive representation. Although it remains possible that managers selectively ignore deviants, managers at the company studied appear not to realize how early promotions are occurring and seem not to recognize the number of managers who remain in one position until retirement. These inaccuracies are particularly curious because it is no secret that most managers do not leave the company until they retire. That employees overlook the existence of long-plateaued older managers may explain or reflect an American fantasy that promotion opportunity continues forever (Rosenbaum, 1984).

Another characteristic is that the managers studied created larger differences between organizational statuses than exist in reality. Compared with actuality, typical age judgments systematically exaggerated the differences between the first five career levels. In typical age judgments, levels 1 and 5 are, on the average, 10 years apart. In actuality, levels 1 and 5 are, on the average, only two years apart. Managers appear to believe they are on an age-based career ladder when, in fact, it is unclear that such a ladder exists.

Certainly, research suggests that people appear aware of age-graded timetables (Bailyn & Lynch, 1983; Kanter, 1977; Lawrence, 1980; Martin & Strauss, 1956; Sofer, 1970). The unarticulated and probably unconscious use of such timetables in evaluation, in conjunction with the appearance of age-graded norms in virtually all social systems (Lawrence, 1987: 51), suggests that age norms may be basic assumptions (Schein, 1985) within organizational cultures. If age grading occurs and differs in other organizations, career plateaus and technological obsolescence may be organizationally specific manifestations of such norms. A 35-year-old middle manager may be plateaued in one company and on a fast track in another. Mergers may be complicated when firms have top management teams of widely differing ages. And employees who choose lateral transfers or career slowdowns at the wrong age may unknowingly risk their future chances for promotion. Such organizational issues have frequently been attributed to chronological aging, but position on an age-graded timetable may better explain them.

Finally, the results suggest that age distributions may play an important role in career systems. If, as suggested by this study, age norms evolve from actual age distributions, the changing age distribution in this country may signal subsequent changes in age norms. This raises the important question of how responsive age norms are to changes in age distributions. Do employees tend to hang on to old judgments, or do they quickly perceive a changing social order? Predicting a socially generated age effect such as managerial promotion preferences thus requires knowledge of the stability of age judgments under conditions of a stable age distribution and of the dynamics that determine the time lag between a changing age distribution and subsequent changes in judgments. Moreover, if age norms do influence employee motivation and performance, understanding how such norms evolve will help promote the design of better organizational structures. Work groups selected for age diversity, for instance, may increase the range of ages considered acceptable by employees and thus increase the potential high-performance period.

Results from this study are consistent with the explanation that age distributions drive the development of age norms that in turn influence employee behavior. However, the lack of consensus on age norms suggests an addition to the theory. Some respondents thought that age norms differed from those agreed upon by most other respondents in the company, and it is interesting to speculate whether these deviant individuals experience age norms differently. Some managers may perceive but disagree with and ignore the norms, whereas others may be unaware of the norms in the first place. Assuming that some relationship exists between performance ratings and actual performance, such individual perceptions may be useful for explaining how behind-schedule managers maintain high performance in spite of the social pressures that define them as "over the hill." Thus, the effect of age norms on individuals may depend on individual differences as well as on normative and demographic age groupings. Understanding the separate effects of and the joint interaction between these three methods of matching age categories with roles and statuses helps in elaborating how people create, recreate, and maintain continuity at work by using age to index their expectations.

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CONSEQUENCES OF QUALITY CIRCLES IN AN INDUSTRIAL SETTING: A LONGITUDINAL ASSESSMENT

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The purpose of this study was to test the consequences of implementing quality circles in an industrial setting. Using a longitudinal and experimental research design, the study tracked 73 employees organized into eight circles over a three-year period. A matched-pairs comparison group was drawn from another plant within the same company. Results indicated that attitudes, behaviors, and effectiveness all improved initially for the experimental group but then dropped back to previous levels. Implications for future research and practice are discussed.

In recent years, the topics of Japanese management practices in general and quality circles in particular have been frequently discussed in the popular press and managerial literature. Unfortunately, however, there is a paucity of scientific research into the true value and usefulness of quality circles. In particular, much of the research concerned with quality circles in the United States is anecdotal or cross-sectional. The research reported here was undertaken as a first step toward developing an empirical basis for assessing the consequences of quality circles for both the participants in the circles and the sponsoring organization. The study was a longitudinal and experimental investigation into the effects of quality circles on participants' attitudes and job performance. In addition, it assessed managerial opinion as to the value of the quality circles for enhancing organizational performance.

RESEARCH ON QUALITY CIRCLES

Quality circles, or QCs, are generally defined as "small groups of volunteers from the same work area who meet regularly to identify, analyze, and solve quality and related problems in their area of responsibility" (Munchus, 1983: 255). They usually consist of eight to ten members and meet once a week during normal working hours. Moreover, members of QCs usually receive some form of training in problem-solving techniques.

Keys and Miller (1984) noted that QCs are rooted historically in the humanistic tradition represented by human relationists like Argyris, McGregor, and Likert. Previous research has also clearly documented that QCs are not as much a Japanese invention as an American invention of which the Japanese were the first adopters (Cole, 1980). Japanese managers have historically been more receptive and committed to employee participation in the workplace than have American managers. Since QCs are basically a formal mechanism for channeling and directing employee participation, it follows logically that QCs would be more widely adopted in Japan than in the United States.

QCs first came into vogue in U.S. companies around the beginning of this decade. The strengths of the Japanese approach to management were being formally acknowledged, and American managers were looking for ways to compete more effectively. One source of tactics was the Japanese themselves. Ouchi's work (1981a, 1981b) on Japanese management practices, for example, was very well received in the United States by managers looking for ways to enhance organizational effectiveness. So, too, was the concept of QCs.

Meyer and Stott (1985) recently estimated that at least 500 U.S. firms are currently using QCs. They also noted the lack of evaluative research undertaken to assess the effectiveness of the circles. Indeed, most of the evidence pertaining to their effectiveness is anecdotal or based on cross-sectional survey research (Weiss, 1984).

The sparse scholarly research that is available also provides inconclusive or noncomparable evidence. Lawler and Mohrman (1985), for example, reported on the experiences that many organizations have had with QCs. Their observations are apparently based on the popular literature and their own consulting observations. They noted that some firms report considerable success with QCs and others report less success. They also noted that although QCs have certain advantages, they are poor vehicles for institutionalizing participation in general and that if an organization wants to adopt a more participative culture, a broader, more institutionalized strategy is needed.

In the most rigorous assessment published to date, Marks, Mirvis, Hackett, and Grady (1986) surveyed 46 participants and 46 nonparticipants before and after the implementation of a quality circle program in a single plant. Their results suggested that the QC program tended to buffer participants from negative contextual factors but did little to enhance the quality of work life. They did find, however, that both productivity and absenteeism improved modestly but significantly for participants over a 24-month period following the implementation of the QC program.

In summary, then, much has been written, but little learned, about the use of quality circles in organizations. There are several apparent reasons for that state of affairs. First, no consistent theoretical framework has guided the use of QCs—there is no theory of quality circles. Such a framework could serve to guide implementation, clarify expectations, and explain consequences. Second, since the widespread use of QCs in this country is a fairly recent development, perhaps researchers have simply not yet had sufficient time to undertake rigorous assessments. Finally, the empirical evaluation of QCs brings the same difficulties confronted in research in other organizational areas. Namely, it is often difficult to find sponsoring organizations and to then elicit the requisite cooperation for rigorous evaluation. Thus, researchers may gain entrée only after a QC program is already underway, be asked to analyze flawed data collected by the organization, or not be allowed to design a truly rigorous study to begin with.

RELEVANT THEORY

Although the development of a theory of quality circles is beyond the scope of this study, it is possible to draw several clear inferences about QCs from existing theory and previous research as well as from organizational practice. The implicit theoretical foundation for the use of QCs is participation. QCs are seen as a formalized avenue for eliciting and managing employee participation in relevant operational areas (Marks et al., 1986; Munchus, 1983).

Historically, participation has been seen as an avenue for achieving a variety of outcomes. First, researchers have often cited participation as a method for enhancing employee attitudes and behaviors. For example, participation has commonly been studied in conjunction with satisfaction (Griffin & Bateman, 1986). Research has linked organizational commitment, another important attitude, to both satisfaction (Griffin & Bateman, 1986) and participation (Munchus, 1983). Intentions to quit have also been tied both descriptively (Munchus, 1983) and empirically (Marks et al., 1986) to participation in QCs. Finally, there is empirical support for a relationship between participation in a quality circle and individual performance (Marks et al., 1986).

The broader literature on participation, however, is inconsistent regarding the effects of participation on various outcome measures. At one time, it was generally believed that participation caused employees to feel more satisfied, be more productive, and so forth. Later investigation has seen much of the research on which those beliefs were based as deficient in one or more ways. For example, two recent meta-analyses (Miller & Monge, 1986; Wagner & Gooding, 1987) have suggested that methodological artifacts explain many of the positive relationships found between participation and its presumed outcomes. Nevertheless, the relationships have not been refuted but simply called into question. Thus, there is still a reasonable basis for expecting positive consequences to result from increased employee participation.

The second set of outcomes that organizations evidently hope to achieve with QCs relates to overall organizational performance. First, the individual outcomes are presumed to aggregate to the benefit of an organization. Second, and more specifically, management expects the circles to provide tangible and objective suggestions and methods that will lead to such direct benefits as lower costs, improved quality, and more efficient work procedures.

HYPOTHESES

In summary, then, QCs are presumed to have positive effects at two levels of analysis. First, they may result in improved attitudes and behaviors for individual employees. Second, they may result in improved financial performance for an organization as a whole. Accordingly, the following hypotheses were tested in this research.

> *Hypothesis 1: Participants in quality circles will report higher levels of job satisfaction than will nonparticipants.*
>
> *Hypothesis 2: Participants in quality circles will report higher levels of organizational commitment than will nonparticipants.*
>
> *Hypothesis 3: Participants in quality circles will perform at higher levels than will nonparticipants.*
>
> *Hypothesis 4: Participants in quality circles will report fewer intentions to quit than will nonparticipants.*
>
> *Hypothesis 5: Managers will report positive assessments of the contributions of quality circles to organizational effectiveness.*
>
> *Hypothesis 6: Quality circles will provide measurable financial returns to the sponsoring organization.*

Each of the hypotheses is consistent with the implicit theory underlying the use of quality circles and with the sparse evidence available to date. The first four pertain to outcomes that are reasonably expected to accrue to individuals, and the last two underscore the organizational benefits that should follow from the use of QCs.

METHODS

Overview of the Study

To test the hypotheses summarized above, a field experiment with a pretest-posttest, nonequivalent control group design employing repeated measures was conducted. One plant provided an experimental group of individuals who had volunteered to participate in QCs, and another plant within the same company provided a matched comparison group. I measured affective and behavioral variables immediately before initiation of the QC intervention (time 1) and again 6 months (time 2), 18 months (time 3), and 36 months (time 4) later. Limited interview data were also collected from both participants and managers at the 18-month mark and again 48 months after initiation.

Research Sites and Participants

The study was conducted in two manufacturing plants of a moderate-sized electronics company. The company has a total of six assembly plants located in five states. The two plants located in the same state were used for this study.

Plant managers within the company enjoy considerable autonomy over local issues like the management of turnover, the establishment of wages appropriate for local labor conditions, and so forth. During the time of this study, the company was doing fairly well financially but was also quite sensitive to the inroads foreign manufacturers were making in the electronics industry. In response to that threat, the company was quite actively keeping abreast of new management techniques and practices, especially those associated with the Japanese. Quality circles were one technique that attracted the attention of top managers.

In early 1982, the six plant managers attended a presentation sponsored by corporate management on the advantages and disadvantages of quality circles. They were then offered the option of choosing to implement a QC program in their plant or to postpone a decision until more facts were available on the effectiveness of QCs. Four managers decided to implement circles, and the other two decided to wait.

During the planning stages of the program, in mid-1982, the human resources manager at one of the plants about to adopt QCs contacted me and requested that I monitor the effectiveness of the effort. I decided to restrict the study to the one plant, with one other plant not using QCs providing comparative data. The manager of the experimental plant contacted his counterpart at the other plant, in another major city in the same state, and enlisted his cooperation in providing a comparison group. That manager had decided to not implement the QC effort and had indicated in the initial meeting that he did not foresee wanting to use QCs in the foreseeable future. His reasoning was that he had always followed a participative approach to management, and he saw QCs as doing little more to enhance participation than he was already doing.[1]

The experimental plant, hereafter referred to as plant A, had a workforce of 496 employees at the time the study was planned. The plant was located in a city of approximately 1.2 million in the Midwest. The comparison plant, called plant B, was located in a city of around 900,000 across the state. This plant employed 427 employees at the beginning of the study. The two plants produced a variety of electronic measuring and control devices such as metering instruments, gauges, and control panels. Both plants produced the same set of products, employed the same technologies and operating systems, and had highly similar layouts.

In-depth interviews with both plant managers and human resources managers at the two plants suggested that there were several minor differences in organizational practices between the plants. For example, plant A used a time clock, and plant B had employees manually complete time sheets. Likewise, plant A required all employees to take their breaks and lunch time according to a fixed schedule, and plant B allowed employees to take their breaks and lunch time whenever they chose. At the time the study was designed, I did not consider those differences to be particularly meaningful, at least in terms of their potential impact on QCs. Hence, the differences were not controlled for or measured. There remains the possibility, therefore, that between-plant differences influenced the pattern of results obtained.

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[1] Conversations with corporate officials suggested that, in reality, his practices were no more participative than those of his counterparts in other plants. He simply saw himself as being more open.

Procedures

All employees at the two plants responded to a baseline (time 1) questionnaire administered on-site by their plant's human resources manager. I was present for about half the sessions at each plant. Employees were told that the survey was part of a company-sponsored study of employee attitudes being conducted by a university researcher. They were assured of confidentiality. In particular, it was explained that I would be summarizing the data for company management but that no one else would have access to their individual questionnaires.

Employees completed the questionnaries in small groups in a conference room during normal working hours. Those who completed it while I was not present were asked to put their questionnaire in a large metered envelope addressed to me. Before each group was dismissed, its envelope was sealed and a volunteer solicited to place the envelope in the mail. Follow-up analyses revealed no significant differences between employees whose questionnaires were collected directly and those who mailed them. Employees who were absent were surveyed on their first day back at work. Employees were asked to identify themselves with their payroll number. I tabulated performance data for the six months immediately preceding the administration of the questionnaires at each time point, including time 1.

Quality Circle Implementation

In early 1983, the QC program was implemented in plant A. Volunteers were solicited through the plant newsletter and through several informational sessions that were scheduled during lunch hours and after work. The company offered no direct financial incentives for participating. Instead, management explained that all employees would benefit through the existing profit-sharing plan if the QC program was able to cut costs and thereby increase profits. A total of 73 operating employees committed themselves to participating in the program. The 73 volunteers were organized into eight quality circles on the basis of general work locations and areas of responsibility. Members of three of the circles were from the same departments and therefore had the same supervisors. Four of the circles included employees from very similar but not identical work units and consequently had multiple employee-supervisor dyads. For example, the members of one circle came from three different departments; their work was quite similar across departments, but they reported to three different supervisors. The remaining circle was more heterogeneous than the others and was specifically charged to address fairly general problems germane to all employees.

At the first meeting of each QC I explained that, to follow up the earlier survey, I was interested in assessing their attitudes and behaviors as they participated in the QC program and asked that they agree to respond to identical questionnaires three more times. The same assurances of confidentiality were made, and all members agreed to participate.

Selection of the Comparison Group

To truly assess change, of course, it is necessary to have a control or comparison group. One alternative was to use others in the same plant as a control. That idea was rejected, however, because those individuals had specifically been given the opportunity to participate and had declined. Thus, there were reasons to believe that there may have been differences between participants and nonparticipants in the same plant.[2] Moreover, interaction between participants and nonparticipants could have affected the data.

Another alternative was to use employees who might be similar to the experimental group but who would be unaware of the treatment and had not specifically rejected an opportunity to participate. This option seemed to have more strengths and fewer weaknesses than the other. Thus, I decided to use a matched-pairs nonequivalent control-group design. The goal was to identify a group of employees in the same company that was as similar as possible to the experimental group. Such a design overcomes all basic threats to validity except the effects of selection-maturation, scaling, and local history (Campbell & Stanley, 1966). Scaling effects are negligible in this form of research (Kaplan, 1964). Local history effects can be partially assessed through the monitoring and assessment of organizational activities. Finally, selection-maturation effects can be determined through the use of treatment-effect correlations (Cook & Campbell, 1976; Joyce, 1986).

The matched group was to consist of 73 employees in plant B whose responses to the questionnaire were as similar as possible to those of the QC participants. I used an iterative comparison process to identify the group. The four individual-level measures used in this study (and discussed in a later section) were first transformed to a common metric of 100 each both for the 73 QC participants and for all employees at plant B. I then used a computer program to match a plant B individual to each QC participant. The procedure was as follows: from the questionnaire scores of a given QC participant, the scores of each employee in plant B were subtracted and the absolute values of the differences summed. The employee at plant B with the smallest total difference was identified as the given QC participant's match.

The 73 people so selected and I met at plant B in small groups. I asked them to participate in a study of employee attitudes the company was conducting, made the same assurances of confidentiality as with the plant A employees, and outlined the same procedures for data collection. It was explained that the study would be comparing data across plants and that they had been randomly selected to participate; the QC program at plant A was not discussed.[3] Three of the original 73 employees declined to participate. Three other employees who provided the next-best match were then chosen; each agreed to participate.

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[2] For example, Brockner and Hess (1986) found self-esteem to be a factor contributing to QC success.

The QC members participated in a two-day off-site training program in problem solving and then began following standard QC procedures. They met once a week for the duration of this study, except for a few weeks when several members were absent from work, such as around Christmas and during peak summer vacation periods. Meetings typically lasted one to two hours, although they occasionally lasted a little longer. Members chose the problems to address and communicated their activities and suggestions to plant management about once a month, reporting on forms prepared specifically for that purpose.

Each group chose its own leader, typically a volunteer from among the members but in a few cases an individual nominated and voted on by the membership. The leaders handled the reporting duties. The QCs tackled a variety of problems. For example, one group recognized that at one stage of assembly, work-in-process was allowed to sit in a high-traffic, open area for several hours and sometimes even for days. When it next entered the work system, it was not uncommon for some of the work to have been damaged. The group developed a plan to rearrange work stations so that the waiting station was close to an unused storage closet. The work-in-process was then stored in the closet. Consequently, waste and damage at this stage were greatly decreased.

Follow-up Measures

The baseline measures described earlier served as time 1 assessments. All individual-level variables were subsequently measured again at 6 months (time 2), 18 months (time 3), and 36 months (time 4). The plants' respective human resources managers administered each follow-up questionnaire on-site during normal working hours.[4]

If an employee from either group had left the company or been transferred during the period of the study, data from his or her counterpart in the other group were not used in the remaining statistical analyses. The size of each group declined to 72 at the 6-month mark, to 70 at the 18-month mark, and to 64 at the 36-month mark.[5]

The executive committee of plant A and the plant controller also provided assessments of the effectiveness of the QC effort at each of the follow-up measurement periods, using 3-item assessment scales developed specifically for this study. Twelve months beyond time 4 (at the 48-month mark), the plant controller also provided an assessment of the financial impact of the QC program.

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[3] The rationale for this mild deception was that if plant B employees were told of the QC program at the other plant, they might question why they were not given an opportunity to participate in such a program themselves. At the very least, it would raise questions in their minds. At the other extreme, it might have made them angry, hostile, or resentful.

[4] I was not present for these sessions; the same sealed envelope procedure described earlier was used.

[5] Follow-up analyses using only the 64 participants across all time points did not reveal any differences in results.

At the time 3 mark, I visited plant A and met with each QC individually. These meetings were unstructured, at the request of the plant manager, and very informal. The purpose of the interviews was to get general impressions as to how the QC program was going, if there were problems, and so forth. More systematic interviews with participants and managers were conducted approximately 12 months after time 4.

Measures

Job satisfaction. Overall job satisfaction was measured with the short form of the Minnesota Satisfaction Questionnaire (MSQ) (Weiss, Davis, England, & Lofquist, 1967). The MSQ is a 20-item instrument that has been shown to have acceptable levels of reliability and validity across a variety of settings (Cook, Hepworth, Wall, & Warr, 1981). Responses are on 5-point scales ranging from strongly agree to strongly disagree. At time 1, the coefficient alpha for this study was .86 at plant A and .90 at plant B.

Organizational commitment. Organizational commitment was measured with the 15-item scale developed by Porter, Steers, Mowday, and Bovlian (1974). Responses are on 7-point scales anchored by strongly agree and strongly disagree. Again, this scale has well-documented psychometric properties (Griffin & Bateman, 1986). The coefficient alpha was .78 at plant A and .83 at plant B at the baseline.

Performance rating. Performance was based on supervisory ratings. Each employee in the two plants received an evaluation every six months. The evaluation involved the supervisor rating the employee on performance quantity (40 points possible), performance quality (40 points), attendance (10 points), and other contributions, such as cooperativeness and willingness to help others (10 points). The four separate indices were summed to provide an overall index of performance with a maximum value of 100. The evaluations, which have been used by the organization for several years, provided the basis for all merit wage increases in the plant.[6] Supervisors had been explicitly told that employee participation in the QC program was not to be considered in the normal evaluations. There were two reasons for this. First, the company wanted the performance data for participants and nonparticipants to be as comparable as possible. Second, the popular literature on QCs argues that no additional compensation should be given to participants. Of course, there was no way to ensure that contamination did not, in fact, occur.

Intentions to quit. Intentions to quit were assessed with the 3-item scale developed by Seashore, Lawler, Mirvis, and Cammann (1982). Responses are

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[6] The company also occasionally provides cost-of-living and seniority-based increases for all employees.

TABLE 1
Baseline Means and Standard Deviations[a,b]

	Plant A		Plant B		Experimental Group		Comparison Group	
Variables	Means	s.d.	Means	s.d	Means	s.d.	Means	s.d.
Job satisfaction	3.23	1.02	3.17	1.10	3.18	0.99	3.12	1.04
Organizational commitment	4.31	1.46	4.49	1.61	4.40	1.42	4.47	1.56
Performance ratings	82.78	12.94	80.44	11.55	80.17	11.64	81.92	12.13
Intentions to quit	3.49	1.26	3.54	1.17	3.31	1.09	3.47	0.98

[a] The results of multivariate F-tests between plant populations, between participant groups, and between participant groups and plant populations minus participant groups were not significant at $p < .05$.

[b] Ns for the four groupings were 496, 427, 73, and 73.

on 7-point scales anchored by not at all likely and extremely likely. The baseline alpha was .93 for plant A and .92 for plant B.

Managerial assessment. Managers at plant A also assessed the effectiveness of each QC relative to its costs at each of the three follow-up measurement points. Four members of the plant executive committee, the plant manager, the operations manager, the human resources manager, and the distribution manager, responded to a 3-item scale summarized in the Appendix. The plant controller provided independent assessments of the effectiveness of the QCs. Although he was also a member of the executive committee, he was perhaps better attuned than its other members to the financial costs and benefits of the QCs within their plant. The three items on the controller's scale paralleled those on the other managers' but were related more specifically to the dollar value of the QC program. The Appendix also lists these items.

After time 4, the controller also provided an estimate of the actual financial costs and benefits of the program. The data were generated as part of a report to corporate management on the cost effectiveness of the program. Because of the proprietary nature of the data, I only received summary figures. Moreover, although there is no reason to question the validity of the data, there is also no evidence of their accuracy beyond the fact that confidence can be placed in generally accepted accounting and reporting procedures.

RESULTS

Table 1 presents the baseline (time 1) means and standard deviations for all variables for both plants and for each group within the plants. I performed MANOVAs to assess mean differences between (1) plant populations, (2) participant groups, and (3) participant groups and plant populations minus participant groups. No significant F-values were obtained. Thus, there were no apparent differences between the two plants or between volunteers and nonvolunteers for the QC program before the QC program was introduced, at least in terms of the four dependent variables under investigation.

Table 2 shows the correlation matrix for the four variables for the experimental and control groups at time 1. The values in upper triangle are within-experimental-group intercorrelations; those in the lower right triangle are within-comparison-group intercorrelations; and those in the lower left square of the matrix are between-group intercorrelations. The strong positive correlations in the diagonal of the square provide support for the validity of the matching procedure. As might be expected, there were also moderate to large correlations among the measures of organizational commitment, job satisfaction, and intentions to quit both within and between groups. Performance ratings were not correlated with any of the other three variables, although performance ratings between the two groups were correlated.

Quantitative Results

A MANOVA was performed on the three individual-level questionnaire-derived dependent variables across time points to assess between- and within-group changes over time. The resultant F-value, 18.13, was significant beyond the .001 level. I then conducted univariate F-tests across time periods for each variable. Table 3 presents results. There were significant differences over time for each variable for the experimental group but not for the comparison group. For example, there was a significant difference between the mean values for job satisfaction within the experimental group across the four time points. There were also significant differences at time 3 between the two groups in mean values for job satisfaction, organizational commitment, and performance ratings, and at time 2 there were significant differences between means for commitment.

Duncan's multiple range tests were then conducted to determine which pairs of means within groups and across time points were significantly different. Table 4 summarizes the results, which show a very clear pattern of changes in the means. The greatest and most consistent changes were between time 1 and time 3, when all four variables in the experimental group increased significantly. By time 4, however, all variables had decreased back to a level not significantly different from time 1 levels.

As noted earlier, treatment-effect correlations were also calculated to assess the possible effects of selection and maturation. As explained by Joyce (1986), this procedure involves correlating measures of a treatment, coded with a dummy variable, with measures of the criterion before and after the treatment. If exposure to the treatment affects the criterion, the treatment-effect correlation between the dummy and criterion should be significant. Since this design was somewhat complex, with multiple criterion variables and three posttreatment measures, it was necessary to employ a multivariate analog. My approach was to conduct a one-way analysis of variance among groups before the treatment and a three-way analysis of variance after the treatment and to compare the results. This approach simulates a pure treatment-effect design (Cook & Campbell, 1976) and controls for both selection and maturation. The pretreatment F-value (1.92) was not significant, but the posttreatment F-value (9.46) was significant at the .01 level. The F-values

TABLE 2
Time 1 Baseline Correlation Matrix for the Two Groups[a]

	Experimental Group				Comparison Group			
Variables	1	2	3	4	5	6	7	8
Experimental group								
1. Job satisfaction	(86)							
2. Organizational commitment	38**	(78)						
3. Performance rating	06	−04	N.A.					
4. Intentions to quit	−24*	−57***	−09	(93)				
Comparison group								
5. Job satisfaction	88***	21	01	−26*	(90)			
6. Organizational commitment	17	84***	07	−29*	38***	(83)		
7. Performance rating	06	08	72***	04	−03	10	N.A.	
8. Intentions to quit	−22	−31**	06	90***	−37***	−51***	07	(92)

[a] Numbers in parentheses are reliability estimates. For each group, $N = 73$. Decimal points have been omitted.

* $p < .05$

** $p < .01$

*** $p < .001$

TABLE 3
Results of Univariate *F*-tests for Differences Between Experimental and Comparison Groups[a]

Dependent Variables	Time 1 (*N* = 73)	Time 2 (*N* = 72)	Time 3 (*N* = 70)	Time 4 (*N* = 64)	Time 4–Time 1 (*N* = 64)	*F*
Job satisfaction						
Experimental group	3.18	3.72	**3.96**	3.34	0.16	5.37*
Comparison group	3.12	3.21	**3.08**	3.27	0.15	1.06
Organizational commitment						
Experimental group	4.40	**5.21**	**6.04**	4.92	0.52	6.72**
Comparison group	4.47	**4.20**	**4.75**	4.81	0.34	2.19
Performance rating						
Experimental group	80.17	82.24	**86.82**	78.04	−2.13	4.82*
Comparison group	81.92	82.02	**80.26**	81.16	−0.76	1.42
Intentions to quit						
Experimental group	3.31	3.04	2.72	3.44	0.13	4.94*
Comparison group	3.47	3.51	3.14	3.37	−0.10	1.36

[a] Pairs of means in boldface are significantly different at $p < .05$.

* $p < .05$

** $p < .01$

TABLE 4
Results of Duncan's Multiple Range Tests[a]

Dependent Variables	Time 1–Time 2	Time 1–Time 3	Time 1–Time 4	Time 2–Time 3	Time 2–Time 4	Time 3–Time 4
Job satisfaction						
Experimental group	.05	.05	n.s.	n.s.	n.s.	.05
Comparison group	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Organizational commitment						
Experimental group	.05	.01	n.s.	.05	n.s.	.05
Comparison group	n.s.	n.s.	n.s.	n.s.	.05	n.s.
Performance rating						
Experimental group	n.s.	.05	n.s.	n.s.	n.s.	.05
Comparison group	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Intentions to quit						
Experimental group	n.s.	.05	n.s.	n.s.	n.s.	.05
Comparison group	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.

[a] Significance levels indicate within-group differences across corresponding time intervals for the variable noted.

TABLE 5
Managerial Assessments of QC Effectiveness

Variables	Time 2	Time 3	Time 4	Time 4–Time 2
Executive committee composite rating	4.40	5.62	4.55	0.15
Controller's rating	3.33	4.67	3.00	−0.33

were also significantly different from each other at the .01 level. Thus, neither selection nor maturation appears to have had a detectable influence on the results.

Finally, Table 5 summarizes the results of the executive committee's and controller's ratings of QC effectiveness. Given the sizes of the data sets, no statistical tests could be conducted. The ratings, however, followed the same pattern as the mean values for the experimental group on the four dependent variables. In particular, the ratings increased from time 2 to time 3 but declined between time 3 and time 4.

Qualitative Results

Considering the qualitative data gleaned through the interviews helps to bring out the meaning and pattern of the empirical results. As noted earlier, the time 3 interviews were very informal and unstructured. I visited the site and met with each individual QC for about 30 minutes, asking general questions about how things were going for the circle, whether the members thought their time was being used wisely, and similar issues. This format was followed because the plant manager did not want the members to feel they were being examined too critically or systematically. Essentially, each group felt that it was doing a good job and making a positive contribution to the organization and that the organization appreciated and valued it. Members of one group expressed some frustration that the organization had not adopted two recommendations they felt very good about. This unhappiness, however, seemed to be relatively minor.

Twelve months after time 4 (about 48 months after the program began) the QC program was still operational. At that point, I again interviewed each of the circles as a group, as well as the plant manager and the controller. The results this time were much different. Few members of the QCs were actually negative, but most had become somewhat indifferent about their participation. Several, for example, noted that the company had started taking them for granted. They felt that their efforts were no longer appreciated as much, that management was becoming less interested in their recommendations, and that they were simply not contributing as much as they had earlier in the program. Each group provided a few anecdotes to support its feelings, and the anecdotes were quite similar across groups. Members generally noted, for example, that managers asked fewer questions about how the group was functioning, displayed less enthusiasm when suggestions were made, and did not evaluate the suggestions as thoroughly as they had earlier in the program.

Some members also speculated that perhaps the QC program had reached a point at which it might be best to discontinue it. One group, for example, recalled that it had initially been easily able to identify problems and solutions. After the obvious problems had been solved, though, the work became harder. Finding problems was difficult, and solving them was even more so.

Only one group really felt that it was making the same level of contributions that it had originally made. Its members seemed to believe that there were plenty of problems to be tackled and that their work was far from done. Even they, however, agreed that they were not as valued by management as they had been earlier.

The tenor of the discussion with the plant manager was consistent with the feelings of the QC members. He too agreed that the QCs were contributing less and less. He thought, for example, that their value to the company had peaked around the 24-month mark and had then started to decline. Interestingly, however, he made no reference to taking the QCs for granted, nor did he think that the list of problems had been exhausted. Instead, he formulated a quite different explanation for the drop in effectiveness. His feeling was that the members of the QCs had simply lost interest in what they were doing. The manager felt that there were many more problems they could choose to address but that they had simply lost their motivation to do so. For example, he observed that they were not as enthusiastic when they met as they had been earlier and that the write-ups of their suggestions were increasingly superficial.

Finally, the feelings of the controller mirrored those of the plant manager, although he took a more balanced approach to understanding why things had deteriorated. At the time of the interview, he had just completed a report requested by corporate management on the effectiveness of the program. He was willing to share important but limited data from that report. In particular, he reported that the QCs had made a total of 122 formal recommendations during the 48 months the program had been in effect. Of those, the company had adopted 81 as proposed, adopted another 10 in a modified form, and rejected the remainder.

He estimated that the total cost of the program to that point was about $142,520—$107,520 in wages, $15,000 for the original training, and $20,000 to implement several of the recommendations. He also estimated that over the 48-month period, the company had realized $65,000 in one-time savings. For example, one QC planned how to best install several new machines; the controller noted that their plan saved the company $8,000 over its standard procedures for installing new equipment. The company was also realizing approximately $20,000 per year in continued cost savings from recommendations about operating systems. For example, the storage of work-in-process in a convenient closet, as described earlier, was estimated to be saving around $1,500 per year in damage costs.

The bottom line for the controller, then, was that the QC program was fairly effective to date. The costs were greater than the benefits, but those benefits would continue to accrue for the foreseeable future. However, he also indicated that many of the benefits had come between the two- and the three-year mark. He noted in particular that the financial impact of the QCs during their fourth year had been minimal. He attributed that pattern to three things: fewer problems to tackle, loss of enthusiasm by the participants, and loss of interest by the management team.

DISCUSSION

The purpose of this study was to assess the consequences of quality circles for both participants and a sponsoring organization. The study employed a longitudinal and experimental design. The results were fairly unambiguous. Scores for the four primary individual-level dependent variables, job satisfaction, organizational commitment, performance, and intentions to quit, improved gradually up to the 18-month mark and then decreased back to their initial levels. During the same periods, management's perceptions of the effectiveness of the QC program followed the same pattern.

On the basis of the organization's own analysis of the effectiveness of its QC program and the findings of this study, the company undertook several changes in the program. For example, about 42 months into the program, the manager of plant B was reassigned to open a new plant for the company. His successor decided to implement a QC program in plant B. At plant A, the manager planned an attempt to revitalize the program. In particular, he decided to meet with each group and express his renewed enthusiasm and commitment to the QC concept. He also decided to implement a new reward system: QC members would share in the cost savings they generated through direct payments. He also decided to solicit volunteers for up to four new circles.

Each of the plant managers at the other four plants also spoke briefly with me. Three who had adopted QCs reported experiences remarkably similar to those at plant A: impressive initial results, with a decline after anywhere from 12 to 36 months. However, their responses to that pattern differed. One manager had already dropped the QC program, and another was planning to drop his program in the near future. The third was still optimistic and, after discussing things with the plant A manager, had decided to follow the latter's strategy for attempting to revitalize the program.

Thus, the evidence is fairly straightforward and consistent: in this organization, QCs were successful from the standpoints of both the participants and the organization for around two years but then began to decline. Before that conclusion is accepted at face value, however, rival hypotheses and alternative explanations should be considered.

As noted earlier, the design used in this study entails three basic threats to validity: scaling, local history, and selection-maturation effects. Possible selection-maturation effects were controlled statistically through the treatment-effect correlations comparison, and scaling effects do not play a major role in social experiments. Thus, local history effects would be the remaining threat to consider. The follow-up interview with the plant manager explored the extent to which layoffs, changes in top management, major conflicts at the plant, and labor opposition could have intervened. He said that no such events had occurred during the period of the study and that things had been pretty much "business as usual." Of course, his view may well have been biased, and there were no objective measures or controls available to cross-validate his assessment. Thus, there is no way to assure that local history did not intervene.

Other limitations and issues also constrain the findings. For one thing, it is always possible in research on change that nothing more than a Hawthorne effect has occurred—that employee perceptions and attitudes have altered because of increased attention, measurement, or other factors rather than because of the specific intervention studied. In addition, there is no meaningful way to determine the representativeness of the QC program. There is a general feeling, for example, that in Japanese organizations a very high percentage of the workforce is involved in QC activities (cf., Cole, 1980). However, there are no published statistics available as to what the exact percentage is. Likewise, there are no statistics available regarding the extent of QC participation in American companies that have adopted the approach. In all likelihood, there are some companies with only a small percentage of their workers involved in QCs, and others with a much higher level of participation. The fact remains, however, that a reasonable number of people in the organization studied did participate in what appears to be a representative QC program.

Beyond those considerations, it can only be noted that as much care as possible was taken to ensure the strongest and most thorough assessment of the QC program. The multiple measures, for example, provided at least reasonable additional support for the validity of the findings.

Given the inherent strengths and weaknesses of the design, then, there are several possible implications that can be drawn from this study both for theory and research and for practice. Lawler and Mohrman (1987) recently described a so-called honeymoon effect in quality circle programs. They noted that "during this phase a small number of groups is formed; these groups are strongly motivated to produce good ideas and improvements, and as a result the organization often realizes significant gains" (1987: 43). Most organizations consequently add many more groups, which have to compete for management attention and are established more mechanistically than the original groups. The overall program is subject to declining interest, nonproductive groups, and extra costs. They concluded that QCs are best viewed as transitional techniques for implementing a more participative culture in an organization. For example, they suggested that QCs be transformed into task forces and then workteams and also advocated adding a reward component to QC participation after a program is institutionalized.

Taken together with the results of this study, Lawler and Mohrman's suggestions seem quite plausible. The honeymoon effect is quite likely what occurred at plant A. Although the organization did not add new circles right away, there was clear evidence of an increasingly mechanistic approach and declining interest and enthusiasm. The organization's later decision to add more circles and implement a reward component also fits Lawler and Mohrman's conclusions.

An alternate approach might also call for the use of QCs as an organic short-term strategy for enhancing organizational effectiveness. In particular, in some settings it might be possible to develop a QC program, monitor the results, and disband groups as their effectiveness begins to diminish. Of course, the organization that takes such an approach runs the risk of resentment or hostility from its workers if they do not share management's perceptions of diminishing effectiveness.

The organization studied has apparently achieved some value from its QC program. It incurred considerable costs but is likely to realize long-term gains. It also seems quite likely that QC programs will remain in vogue for at least the near future. In all likelihood, QCs will become another in a set of organizational change interventions (like job enrichment, MBO, and modified workgroups) that are appropriate and effective in some settings but less appropriate and effective in others. Thus, there is a clear need for additional research into the effects of QCs. In particular, we need to develop additional insights into all of the following questions: When are QCs most effective? Who chooses to participate in QCs? How should QCs be managed? Can the extent of their effectiveness cycle be increased? Can their costs and benefits be more accurately measured? Are they best viewed as a self-contained intervention or as a transitional technique?

To approach such questions, it will be necessary to develop research programs that span a variety of organizations, rely on both participant-level and organizational measures and data, and take a long-term, experimental view. In addition, careful consideration should be given to the organizational context of QCs.

Finally, as noted earlier, the use of QCs is implicitly grounded in the theory of participation in workplaces. The literature on participation strongly argues for its positive effects on a variety of outcomes, although the empirical research on such effects is less than convincing. The present study, then, can also be seen as making a valuable contribution to that literature. Although the effects of other participative strategies may have differed, the approach studied here yielded fairly clear and unambiguous patterns over time. It seems reasonable to speculate that other approaches to participation might well have resulted in the same pattern. That is, perhaps the context and general nature of participation, not a given participative technique, cause change effects to first increase and then diminish.

The behavioral sciences have enormous potential to add to organizational effectiveness. Carefully managed interventions like quality circles have the potential to aid managers as they attempt to compete in both domestic and international arenas. The key to effectiveness may be to avoid a faddish, bandwagon approach and, instead, to develop an appropriate menu of interventions that we have some basis for recommending and some understanding of how to manage.

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APPENDIX

Managerial Assessment Items

All responses were on 7-point scales ranging from strongly agree (7) to strongly disagree(1). The three items for the managers (α = .96) were:

1. Relative to the costs of the program, the QCs in the plant are making a great contribution to plant effectiveness.
2. The QC program in this plant has been quite successful.
3. All things considered, the QC program in this plant has done all it was expected to do.

The three items for the controller were:

1. The dollar savings generated by the QCs in our plant are greater than the costs of running those QCs.
2. The suggestions made by the QCs have saved the company money.
3. The financial impact of the QC program in this plant has been more positive than negative.

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DUAL AND UNILATERAL COMMITMENT AMONG STEWARDS AND RANK-AND-FILE UNION MEMBERS

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This study investigated commitment patterns among stewards and among rank-and-file union members. Stewards had a higher frequency of both dual and unilateral union commitment than did the rank and file. Positive union-management relations, high job satisfaction, and positive union decision-making practices were consistently related to high dual commitment. High union involvement, positive perceptions of union decision-making practices, and low job satisfaction were consistently related to unilateral union commitment. An explanation of the findings based on exchange theory is offered.

There has been an interest among behavioral scientists in dual and unilateral commitment since the 1950s (Dean, 1954; Purcell, 1960; Stagner, 1956). Dual commitment refers to a worker's positive attachment to both a union and an employing organization. Unilateral commitment describes a positive attachment to a union or to an employer, but not to both (Stagner & Rosen, 1965).

Various theoretical explanations of dual commitment have been offered. Offering an explanation rooted in cognitive consistency theory (cf. Heider, 1958), Angle and Perry (1986) held that it is difficult to have simultaneous commitments to organizations that are in conflict with one another. Accordingly, dual commitment is possible when relations between union and management are positive, but the presence of strong conflict tends to push workers toward unilateral commitment to one side or the other.

Stagner, offering another explanation, described dual commitment as a phenomenon arising from people's tendency to perceive their work situation "as a unit, rather than sharply differentiating the union role from the management role" (1956: 406). That explanation implies that conditions such as high job satisfaction and positive union-management relations should lead

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to dual commitment if they are attributable to the joint actions of the two parties. Further, Stagner and Rosen (1965: 70) concluded that unilateral commitment appeared to be the rule among people more deeply involved with one side than with the other.

A third explanation, based on exchange theory, can be derived from the work of Mowday, Porter, and Steers (1982) on organizational commitment. According to exchange theory, if an organization provides a vehicle for the use of an individual's abilities and satisfies his or her needs, the person reciprocates with commitment to the organization. If an organization fails to provide such a vehicle, commitment to it is low. High dual commitment should, then, be related to a combination of variables reflecting a perception of a satisfying exchange relationship with both union and employer. On the other hand, unilateral union commitment should be related to a combination of the same variables reflecting a perception of a satisfying exchange relationship with the union and a less satisfying relationship with the employer. Unilateral employer commitment, the opposite of unilateral union commitment, should be related to a reverse set of conditions to those present for unilateral union commitment.

The consensus (Stagner & Rosen, 1965) of the research conducted in the 1950s and 1960s was that dual commitment was far more common than unilateral commitment. That conclusion was based on the predominant finding of positive correlations between favorable attitudes toward union and employer and on cross-tabulations showing a high percentage of workers exhibiting patterns of positive attitudes toward both organizations.

More recently, Schriesheim and Tsui (1980) concluded that dual commitment is not as prevalent as it was once believed to be. Their data and the findings of several subsequent studies (Angle & Perry, 1986; Conlon & Gallagher, 1986; Dalton & Todor, 1982; Fukami & Larson, 1984; Gallagher, 1984; Martin, Magenau, & Peterson, 1986) have indicated that correlations between employer and union commitment are usually weak. Moreover, cross-tabulations of separate union and employer commitment measures have indicated that the frequency of dual commitment varies widely from study to study (Biles, 1974; Gallagher, 1984; Martin, 1981; Martin et al., 1986).

The findings just cited support Schriesheim and Tsui's (1980) suggestion that there might be a unique set of environmental constraints and contingencies fostering the development of dual commitment. However, a positive labor-management relationship is the only variable that has been related to dual commitment in more than one study (Angle & Perry, 1986; Fukami & Larson, 1982; Gallagher, 1984). In a previous study (Martin et al., 1986), we found that positive views of union decision-making practices, high perceived influence on an employer, and low perceived employment mobility were all related to high dual commitment. The generalizability of those findings needs to be established, however, since they were based on a single group of union stewards.

The purposes of the present study were to: (1) compare the frequency of dual and unilateral commitment patterns among stewards and rank-and-file union members, (2) identify variables consistently discriminating dual and unilateral commitment patterns within and across groups of stewards and rank-and-file union members, and (3) examine the consistency of various theoretical explanations for dual and unilateral commitment with the variables identified.

METHODS

Respondents

Our study included four sets of questionnaire data—two from union stewards and two from the rank and file. All respondents in all four data sets were members of the same local union working at different locations in a midwestern state.

Steward respondents. Questionnaires were administered to all stewards attending the union's annual steward conferences held in the spring of 1982 and the fall of 1983. A questionnaire was mailed to the few stewards who were unable to attend either conference. In 1982, we received 218 usable questionnaires, representing 91 percent of the total steward population of 241. In 1983, 268 were usable, representing 91 percent of the total population of 294. The number of stewards increased from 1982 to 1983 because of a union merger. Approximately 32 percent of the respondents participated in both surveys. Thus, the two data sets are not completely independent of one another.

Rank-and-file respondents. Questionnaires were mailed in the spring of 1981 and 1982 to the homes of 368 rank-and-file union members who had indicated their willingness to participate in a 1980 survey sent to all rank-and-file union members (about 9,570 people). In 1981, 225 returned questionnaires were suitable for data analysis, representing a 61.4 percent completion rate and about 2.4 percent of the 1980 rank-and-file population. In 1982, 104 questionnaires were suitable for data analysis, representing a 30 percent completion rate and 1.1 percent of the 1980 rank-and-file population. About 43 percent of the rank-and-file respondents participated in both surveys.

A comparison of the rank-and-file respondent groups with the entire union membership, including both rank-and-file members and stewards, revealed no significant differences on age; however, in general, the differences suggested that more stable elements of the workforce were overrepresented among the rank-and-file respondents. Tests of the significance of differences (a t-test for means, and a z-statistic for proportions) indicated that our rank-and-file respondents included more men and more senior, full-time, and skilled employees ($p < .05$, two-tailed test) than the population of union members.

Measures

The discriminating, or independent, variables included a number of demographic items and several items and rating scales designed to assess perceived characteristics of the labor-management relationship, the union, the employer, and work-related variables. Nondemographic items and scales not published elsewhere appear in the Appendix. Before analyzing the data, we coded all variables so that larger values would indicate higher levels of the particular variable.

Personal characteristics. A check for multicollinearity indicated that in some data sets job income and skill level had multiple Rs greater than .80 when regressed on the remaining independent variables. High job income, high skill level, and male gender had consistent positive intercorrelations across data sets, indicating that men more frequently held skilled jobs with high pay than did women. Therefore, we combined those variables to form an index of socioeconomic status on the job. Similar positive relationships were found between being married and having children, so we combined those two variables to form a family status index.

In addition to the socioeconomic and family status variables, job tenure, tenure as a steward, age, and education level were measured. Two items taken from the Michigan Organizational Assessment Package (MOAP) (Institute for Social Research, 1975) measured perceived employment mobility.

A measure of involvement in union activities based on previous work by Anderson (1979) and by Gordon, Philpot, Burt, Thompson, and Spiller (1980) consisted of four standardized items concerning the degree to which respondents participated in various union activities. A fifth item, the number of grievances handled, was included in the activities list for stewards.

Labor relations characteristics. One item measured agreement with using the grievance procedure to punish a supervisor. Another single-item variable, integrative contract administration, assessed agreement with finding practical solutions to problems rather than sticking to the letter of the contract. A 5-item integrative bargaining scale based on Frederickson's (1969) work assessed whether respondents viewed collective bargaining as a problem-solving process. We assessed the perceived quality of union-management relations with an 8-item semantic differential scale developed by Rosen, Greenhalgh, and Anderson (1981).

Union characteristics. A 5-item scale measuring members' perceptions of union decision-making practices was partially based on items from Anderson's (1979) study of union participation. We used a 5-item steward-effectiveness scale developed by Peterson and Martin (1986) to assess how effective rank-and-file members thought their stewards were in representing them.

Employer characteristics. The measure of perceived influence on their employer consisted of three items taken from the MOAP relating to employees' perceived influence on work-related decisions. Supervisor support was measured with a 4-item scale adapted from the MOAP and from previous research (Martin et al., 1986). A single item, promotional opportunity, assessed the perceived probability of receiving a promotion.

Work-related characteristics. Job satisfaction was measured with Hoppock's (1935) 4-item scale. Unit size, taken from union records, was based on the number of union members employed at each work location.

Commitment. The 3-item union and employer commitment scales consisted of the same items listed by Martin and Peterson (1987).

Table 1 presents the means, standard deviations, and where appropriate, alphas for the independent and dependent measures. The reliabilities for almost all labor relations, union, employer, work-related, and commitment scales were fairly high ($\geq .70$). That was not the case, however, for many of the personal characteristic scales, whose reliabilities were consistently below .70.

Table 2 presents an intercorrelation matrix of all independent and dependent variables for the largest data set in each category of respondents. Intercorrelations for the 1981 rank-and-file members are above the diagonal, and those for the 1983 steward data set are below the diagonal.

RESULTS

Commitment Patterns

Table 3 reports the frequency of commitment patterns across data sets. For this analysis, we formed high- and low-commitment groups by cross-tabulating employer and union commitment measures dichotomized into values either greater than or less than or equal to the scale midpoints. We used the scale midpoint so that a consistent definition of high and low commitment would be applied across all groups. A test for the difference between independent proportions (Ferguson, 1966: 176) showed higher levels of dual commitment were significantly ($p < .0001$) more frequent in both steward groups than in either rank-and-file group. In addition, a significantly ($p < .0001$) larger proportion of stewards in both groups were unilaterally committed to the union, compared with either rank-and-file group.

Table 1 shows the mean levels of employer and union commitment in each of the four data sets. The data indicate that as a group rank-and-file union members were higher on employer commitment than on union commitment in both 1981 and 1982. However, the results of the t-tests were significant ($p < .01$, two-tailed test) only for 1982. In comparison, stewards had significantly ($p < .001$, two-tailed test) higher commitment to the union than to their employer in both data sets.

Four t-tests comparing each of the two steward data sets with each of the two rank-and-file data sets indicated that stewards were significantly higher than the rank and file ($p < .001$, two-tailed test) on union commitment but that the groups did not differ in their levels of employer commitment.

Correlations between employer and union commitment were computed to provide a measure of dual commitment comparable to that used in some of the cited studies of dual commitment. The respective correlations for the rank-and-file, 1981; rank-and-file, 1982; steward, 1982; and steward, 1983 data sets were .01, .03, .13, and .17. The correlation was significant only for the 1983 steward group ($p < .01$, two-tailed test).

TABLE 1
Summary Statistics of Variables by Data Set[a]

Variables	Rank and File, 1981			Rank and File, 1982			Stewards, 1982			Stewards, 1983		
	Alphas	Means	s.d.	Alphas	Means	s.d.	Alphas	Means	s.d.	Alphas	Means	s.d.
Personal characteristics												
Job socioeconomic status	.49	0.00	2.11	.69	−0.04	2.35	.71	0.00	2.38	.74	0.00	2.43
Tenure		6.20	4.23		8.88	4.28		8.76	5.04		9.64	5.41
Family status	.63	0.00	1.70	.79	0.01	1.82	.60	0.00	1.69	.59	0.00	1.68
Age		30.95	8.64		30.85	7.62		32.72	8.02		35.14	8.79
Education		13.28	1.53		13.37	1.64		12.94	1.42		12.85	1.45
Employment mobility	.65	7.83	3.15	.64	6.67	3.32	.64	6.65	3.00	.63	6.77	3.24
Steward tenure								3.30	3.25		4.36	3.07
Union activities	.63	−0.01	2.73	.57	−0.15	2.49	.62	0.01	3.16	.53	0.00	2.93
Labor relations characteristics												
Grievance to punish		3.90	1.88		3.54	1.97		2.98	1.79		3.78	1.87
Integrative contract		4.97	1.63		4.95	1.74		4.40	1.66		5.63	1.11
Integrative bargaining	.83	26.59	4.87	.87	27.56	5.01	.72	29.09	3.26	.77	28.40	3.38
Union-management relations	.93	26.10	8.65	.90	25.79	7.75	.94	29.32	8.17	.92	29.98	8.45
Union characteristics												
Union decision making	.75	17.57	5.57	.77	15.88	6.16	.79	25.14	5.56	.77	23.35	5.65
Steward effectiveness	.93	24.22	7.53	.93	23.78	6.71						
Employer characteristics												
Influence on employer	.80	8.62	4.13	.81	7.51	4.00	.82	10.32	4.32	.87	9.10	4.41
Supervisor support	.80	14.41	6.19	.85	14.12	6.68	.83	15.29	6.22	.85	15.21	6.59
Promotional opportunity		2.94	1.83		2.64	1.81		2.45	1.51		2.72	1.82
Work-related characteristics												
Job satisfaction	.83	17.56	3.95	.85	16.91	4.14	.84	18.36	3.60	.86	18.10	4.06
Unit size		294.04	116.01		297.66	113.46		224.80	140.57		176.31	131.25
Commitment measures												
Union	.88	10.65	4.65	.85	9.85	4.51	.69	15.98	3.05	.80	15.42	3.74
Employer	.89	11.40	5.00	.88	11.62	4.39	.84	12.32	4.06	.87	11.48	4.03

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[a] The number of respondents in each group was as follows: rank and file, 1981, 225; rank and file, 1982, 104; stewards, 1982, 218; stewards, 1983, 268.

TABLE 2
Intercorrelations of All Variables for Two Data Sets[a]

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Personal characteristics																					
1. Job socioeconomic status		20	09	–03	05	00		28	18	–05	02	–10	–15	07	–12	–05	02	–06	–51	–12	–04
2. Tenure	31		33	48	01	–25		34	09	–15	03	–27	–06	06	–09	–16	–22	–04	–24	01	–14
3. Family status	19	20		44	–11	–22		17	04	–03	13	–10	–06	14	–05	–10	–16	14	–17	01	11
4. Age	–04	31	22		–27	–25		08	–07	–14	08	–12	–10	05	00	–02	–25	13	–23	03	06
5. Education	10	–01	–28	–30		21		08	–07	07	–07	–01	–05	–11	–22	–09	01	–24	10	–08	–12
6. Employment mobility	05	–10	00	–11	10			02	02	04	–19	–01	–02	–18	–22	–07	–02	–37	04	–01	–28
7. Steward tenure	20	48	12	32	–01	–09															
8. Union activities	29	10	04	–01	03	00	33		09	–20	06	–30	00	03	–25	–26	–15	–16	–10	17	–26
Labor relations characteristics																					
9. Grievance to punish	06	02	–06	–06	02	–05	–04	07		–11	–12	–11	–06	13	–16	–16	–08	–18	–16	10	–24
10. Integrative contract	–12	05	02	15	–11	–05	–02	–05	–09		09	–11	–08	–09	05	04	07	02	10	–16	13
11. Integrative bargaining	–02	12	–05	11	–03	–09	25	11	–09	28		12	27	20	04	09	–02	18	–01	23	23
12. Union-managementrelations	–07	05	01	03	–01	–14	08	–23	–11	13	13		39	16	38	36	22	32	01	32	44
Union characteristics																					
13. Union decision making	–17	00	–07	10	–05	–08	08	04	–09	03	08	23		35	14	12	04	17	12	64	15
14. Steward effectiveness															11	08	–04	10	–08	31	10
Employee characteristics																					
15. Influence on employer	–12	01	–06	04	–03	–01	–04	–26	–03	07	–11	38	29			41	32	39	09	06	39
16. Supervisor support	–08	–02	–03	–06	–03	–04	–08	–20	–06	05	12	44	17		34		20	39	–12	07	41
17. Promotional opportunity	00	–11	–12	–23	13	–13	–14	–09	02	06	01	17	15		26	30		19	13	–01	34
Work-related characteristics																					
18. Job satisfaction	–09	–01	09	26	–29	–19	02	–16	–03	09	08	28	19		32	35	21		00	12	57
19. Unit size	–07	–02	–21	–07	18	–16	06	–26	–01	–15	04	–29	03		–30	–21	02	–21		07	03
Commitment measures																					
20. Union	–17	03	–06	04	–06	–19	14	19	–09	09	24	13	57		01	–06	–01	07	21		01
21. Employer	–06	06	–06	15	–04	–27	08	–14	02	09	07	39	25		34	34	26	51	–04	17	

[a] Correlations for the rank and file, 1981, data set are above the diagonal and those for stewards, 1983, are below the diagonal. Decimal points have been omitted.

TABLE 3
Frequency of Commitment Groups by Data Set

Commitment Groups	Rank and File				Stewards			
	1981		1982		1982		1983	
	N	Percentage	*N*	Percentage	*N*	Percentage	*N*	Percentage
High dual commitment	28	12.4	11	10.6	97	44.5	94	35.1
Low dual commitment	88	39.1	43	41.3	16	7.3	35	13.1
Unilateral commitment—union	46	20.4	14	13.5	89	40.8	116	43.3
Unilateral commitment—employer	63	28.0	36	34.6	16	7.3	23	8.6
Totals	225	99.9	104	100.0	218	99.9	268	100.1

Variables Discriminating Commitment Patterns

Discriminant analysis was performed on the data in order to identify which of several interrelated variables consistently discriminated dual and unilateral commitment patterns across groups of stewards and rank-and-file union members. We established high and low dual and unilateral commitment groups within each of the four data sets by cross-tabulating employer and union commitment measures dichotomized into values either greater than or less than or equal to the median score on each measure. For this analysis we used the median instead of the scale midpoint since it produced a more nearly equal distribution of cases between high and low groups that still differed in their relative levels of commitment to union and employer.

Two sets of orthogonal comparisons were of interest within each data set. One involved comparing the high dual commitment group (high employer–high union) with the low dual commitment group (low employer-low union). The other involved comparing the unilateral union commitment group (low employer–high union) with the unilateral employer commitment group (high employer–low union).

Each of the eight columns in Table 4 displays the statistics derived from the discriminant analysis for a separate comparison between commitment groups. The statistics in the first four columns correspond to the comparisons between high and low dual commitment groups within each of the four data sets. The statistics in the last four columns correspond to comparisons between the unilateral union and unilateral employer commitment groups.

The canonical correlation coefficients in the bottom portion of Table 4 indicate a moderate to strong association (0.66 to 0.83) between group membership and the discriminant function for every comparison. The eta-squared statistic indicates a substantial proportion of shared variance (0.44 to 0.69) between group membership and the discriminant function scores. Moreover, the chi-squared values are significant ($p < .001$) for every comparison. Those statistics and the high percentage of cases correctly classified in all comparisons indicate that the discriminant functions are effective in differentiating individuals holding different commitment patterns.

The top portion of Table 4 displays the structure correlations. Generally, variables with loadings of less than .30 are disregarded when interpreting discriminant functions. We considered loadings of .30 or better in at least three of the four data sets to indicate a consistent relationship. The structure correlations for the variables most consistently related to the function differentiating the high and low dual commitment groups indicated that membership in the high dual commitment group was related to more positive perceptions of union-management relations, more positive views of union decision making, and higher job satisfaction. The most consistent structure correlations for the unilateral commitment comparisons indicated that the individuals unilaterally committed to the union had more positive views of union decision making, lower job satisfaction, and involvement in more union activities than their counterparts who were unilaterally committed to their employer. The perception of few promotional opportunities was consistently related to unilateral union commitment among the rank-and-file groups but was not among stewards. Poor union-management relations and low perceived influence on the employer were consistently related to unilateral union commitment for stewards but not for the rank and file.

Variables Related to Employer and Union Commitment

Stagner (1956: 406) argued that dual commitment arises from the tendency of people to perceive their union and employer as a unit and to give credit to both when their work situation is positive. That argument implies that variables related to dual commitment should predict both union and employer commitment measures. We conducted a simple regression analysis to answer this question and to see how dual and unilateral commitment were related to underlying patterns of commitment to employer and union.

Consistent with the findings of other studies (Fukami & Larson, 1984; Martin et al., 1986), our data indicated few common predictors of commitment to union and employer. Union decision making, the most significant predictor of union commitment in all four data sets, was a significant predictor of employer commitment in only one. Similarly, job satisfaction, the most significant predictor of employer commitment in all four groups, was not a significant predictor of union commitment in any group. Union-management relations was the only variable that gave any indication of being related to both union and employer commitment. However, even that variable appeared to be more consistently and strongly related to employer commitment than to union commitment.

DISCUSSION

Research Findings

Our data provide partial support for Stagner and Rosen's (1965: 70) hypothesis that those who are more deeply involved in a union are fre-

TABLE 4
Structure Correlations and Discriminant Function Statistics for Dual and Unilateral Comparisons[a]

	Commitment Group Comparison							
	High Dual Versus Low Dual[b]				Unilateral Union Versus Unilateral Employer[c]			
	Rank and File		Stewards		Rank and File		Stewards	
Variables	1981 (*N* = 107)	1982 (*N* = 56)	1982 (*N* = 119)	1983 (*N* = 152)	1981 (*N* = 118)	1982 (*N* = 48)	1982 (*N* = 99)	1983 (*N* = 116)
Personal characteristics								
Job socioeconomic status	−.21	−.14	−.17	−.08	−.12	−.22	**−.32**	−.06
Tenure	−.10	−.05	−.03	.11	.10	−.05	−.04	.02
Family status	.13	−.11	.03	−.11	−.07	−.06	−.27	−.03
Age	.08	−.11	.20	.15	.00	−.15	−.15	−.12
Education	−.14	−.04	−.17	−.08	−.02	−.08	−.06	.01
Employment mobility	−.23	.04	.09	**.43**	.23	−.14	.00	.07
Steward tenure			.14	.20			.20	.02
Union activities	−.08	.09	−.03	.08	**.36**	.29	**.46**	**.32**
Labor relations characteristics								
Grievance to punish	−.14	−.08	**−.30**	−.06	.21	.01	.03	.02
Integrative contract	.00	−.03	.04	.18	−.22	−.19	.16	.06
Integrative bargaining	**.32**	.06	.13	.28	−.04	.12	**.33**	.17
Union-management relations	**.47**	.29	**.44**	**.38**	−.10	−.10	**−.40**	**−.32**
Union characteristics								
Union decision making	**.65**	**.56**	**.72**	**.61**	**.46**	**.33**	**.38**	**.30**
Steward effectiveness	.26	**.31**			.16	−.04		
Employer characteristics								
Influence on employer	**.33**	.24	**.45**	.14	−.23	−.29	**−.35**	**−.43**
Supervisor support	.24	.18	.24	.18	−.18	**−.33**	−.20	**−.40**
Promotion opportunity	.29	.18	.15	.20	**−.35**	**−.37**	.00	−.26
Work related characteristics								

TABLE 4 (continued)

	Commitment Group Comparison							
	High Dual Versus Low Dual[b]				Unilateral Union Versus Unilateral Employer[c]			
	Rank and File		Stewards		Rank and File		Stewards	
Variables	**1981 (*N* = 107)**	**1982 (*N* = 56)**	**1982 (*N* = 119)**	**1983 (*N* = 152)**	**1981 (*N* = 118)**	**1982 (*N* = 48)**	**1982 (*N* = 99)**	**1983 (*N* = 116)**
Function statistics								
Canonical correlation	0.76	0.83	0.68	0.68	0.71	0.83	0.66	0.74
Eta-square	0.57	0.69	0.46	0.46	0.51	0.69	0.44	0.55
Wilks' lambda	0.43	0.31	0.54	0.54	0.49	0.30	0.56	0.45
Chi-squares[d]	81.21	51.10	66.55	85.85	75.88	44.64	50.83	84.99
% cases correctly classified	90.65	91.07	81.51	84.87	88.14	93.75	83.84	88.79

[a] Table entries are pooled within-groups correlations between canonical discriminant functions and discriminating variables; statistics in boldface are one-structure correlations greater than .30.

[b] A positive correlation indicates a positive relationship with membership in the high dual-commitment group; a negative correlation indicates the opposite.

[c] A positive correlation indicates a positive relationship with membership in the unilateral union-commitment group; a negative correlation indicates the opposite.

[d] All chi-square values were tested with 18 degrees of freedom; $p < .001$.

TABLE 5
Standardized Regression Coefficients for Variables Related to Employer and Union Commitment

	Employer Commitment				Union Commitment			
	Rank and File		Stewards		Rank and File		Stewards	
Variables	1981	1982	1982	1983	1981	1982	1982	1983
Personal characteristics								
Job socioeconomic status	.04	.04	.18**	.03	−.11	−.11	−.18**	−.11*
Tenure	−.07	−.05	−.07	.02	.00	−.04	−.06	.05
Family status	.10	−.05	.00	−.05	−.03	.00	−.05	.01
Age	.08	.11	.17**	.07	.10	−.12	−.08	−.11
Education	.02	.05	.08	.07	−.03	−.03	−.11	−.05
Employment mobility	−.11	−.07	−.03	−.13*	.05	−.08	−.05	−.10
Steward tenure			.00	.04			.19*	.00
Union activities	−.07	−.04	−.08	−.04	.22***	.36***	.06	.13*
Labor relations characteristics								
Grievance to punish	−.09	−.08	−.01	.06	.15**	.06	−.08	−.04
Integrative contract	.11*	.10	.08	.04	−.04	−.04	.01	.05
Integrative bargaining	.09	−.12	−.13*	−.02	.07	.07	.19***	.15**
Union-management relations	.24***	.16	.17**	.20**	.18**	.00	−.07	.12*
Union characteristics								
Union decision making	−.03	.12	.13*	.07	.52***	.63***	.48***	.54***
Steward effectiveness	.01	.04			.07	.09		
Employer characteristics								
Influence on employer	.02	.04	.11	.10	−.04	.14	.04	−.06
Supervisor support	.11	.09	.07	.08	.01	−.07	−.04	−.16**
Promotion opportunity	.20***	.19*	.08	.07	.01	−.05	−.09	−.07
Work-related characteristics								
Job satisfaction	.31***	.44***	.37***	.36***	.02	.03	.02	.04
Unit size	.00	−.03	.03	.12*	.02	.05	.00	.13*

TABLE 5 (continued)

Variables	Employer Commitment				Union Commitment			
	Rank and File		Stewards		Rank and File		Stewards	
	1981	1982	1982	1983	1981	1982	1982	1983
Function statistics								
R^2	.52	.51	.46	.41	.51	.71	.46	.47
Adjusted R^2	.48	.40	.41	.37	.46	.65	.41	.43
Degrees of freedom	18, 206	18, 85	18, 199	18, 249	18, 206	18, 85	18, 199	18, 249
F	12.62***	4.83***	9.42***	9.61***	11.82***	11.43***	9.42***	12.06***

* $p < .05$

** $p < .01$

*** $p < .001$, two-tailed test for standardized regression coefficients; one-tailed test for F statistics.

quently unilaterally committed to it. Unilateral union commitment was one of the two most frequent commitment patterns among stewards. It also emerged significantly more often among stewards than among the rank and file. Comparisons of the means for commitment showed that stewards as a group scored higher on union commitment than on employer commitment, a finding that was consistent with the higher frequency of unilateral commitment among stewards and a contrast to a reverse tendency among rank-and-file union members.

Comparisons between stewards and the rank and file on mean levels of employer and union commitment indicated that being a steward was not related to low employer commitment. Rather, it was related to high levels of union commitment. That finding suggests that unilateral union commitment among stewards may result from increased levels of union commitment rather than from diminished levels of employer commitment. Moreover, the weak correlations between the measures of employer and union commitment suggest that if being a steward does increase union commitment, it will have little, if any, effect on employer commitment.

The relatively high frequency of dual commitment among stewards in comparison to its frequency among the rank and file suggests, however, that Stagner and Rosen's (1965: 70) conclusion about unilateral commitment being the rule among those more deeply involved in a union needs qualification. Instead, high involvement in a union as a steward may lead to high unilateral or dual commitment, depending on the circumstances.

Some earlier research has used positive correlations between employer and union commitment as a measure of dual commitment. A correlation coefficient indicates the extent to which the overall relationship between commitment measures is linear. However, individuals can hold various patterns of dual and unilateral commitment even if the relationship between commitment measures is random. Our frequency data demonstrate that individuals held various commitment patterns even in groups where correlations between commitment measures were very weak. Classifying individuals on the basis of their combined commitment scores would therefore seem to be a more appropriate means of defining dual and unilateral commitment than the correlation coefficient.

Before this study, union-management relations was the only variable that had been repeatedly related to dual commitment. Our results generally corroborated those findings. More important, however, they indicated that union decision-making practices and job satisfaction were also consistently related to dual commitment among both union stewards and rank-and-file union members.

In addition, we found that among both stewards and the rank and file unilateral commitment to a union was most consistently related to high involvement in union activities, perceptions of positive union decision-making practices, and low job satisfaction. Differences between the rank and file and stewards in the variables related to unilateral union commitment suggested that certain factors have differential salience for the two groups.

Promotional opportunities appeared more important for the rank and file, and union-management relations and influence on the employer were more important for stewards.

Theoretical Implications

The relative absence of common predictors of union and employer commitment provides little support for Stagner's (1956: 403) suggestion that dual commitment depends on people's tendency to perceive their work situation as a unit, without differentiating union and employer.

The fairly consistent relationship of union-management relations to dual commitment here and in other studies supports an explanation of dual commitment based on cognitive consistency. The need for cognitive consistency, however, does not readily explain our finding that job satisfaction and union decision making are related to dual commitment.

Although this study did not explicitly examine exchanges, the findings do seem to support the notion that dual and unilateral commitment are related to the specific pattern of separate exchanges that individuals have with each organization. The results of the regression analyses suggested that positive union decision making is related only to a satisfying exchange relationship with a union and job satisfaction only to a satisfying relationship with an employer. Positive union-management relations may be related to a satisfying exchange relationship with both organizations, but it appears more strongly related to the quality of the employee-employer exchange relationship. Thus, dual commitment seems related to a satisfying exchange with both employer and union. The same analysis suggests that unilateral union commitment is related to a satisfying exchange with a union (positive union decision making and high involvement in union activities) and an unsatisfying exchange relationship with an employer (low job satisfaction).

Practical Implications

Although our data cannot establish causal relationships, the findings suggest some practical implications for those interested in having a dually committed workforce. The relationships of union decision making and job satisfaction to dual commitment suggest that unions should work to make their decision-making practices acceptable to their membership and that employers should find ways to make work more satisfying. Our findings on unilateral commitment suggest that if one of the two parties fails in that regard, workers may become unilaterally committed to the other side. If both fail, low dual commitment may result.

The generally positive but weak correlation between employer and union commitment measures suggests that increasing the level of commitment to one organization does not undermine support for the other. The positive relationship of union-management relations to dual commitment suggests that conflict is not necessary for a union to sustain the support of its membership. Neither should management view a union's attempts to make its decision-making practices more effective as threatening. Likewise, management attempts to make work more satisfying should not be threatening to the union. Our findings suggest that such attempts lead to dual commitment so long as an individual has a satisfying exchange with each organization. Knowing that unions and employers need not compete for the commitment of the workforce is especially encouraging at a time when increased competition from foreign and nonunion sources has made cooperation between the two increasingly important.

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APPENDIX

Response choices for all scales, except union activities, ranged from 1 = strongly disagree to 7 = strongly agree. All negatively worded items (indicated by "R") were recoded before data analysis so that they were consistent with positively worded items.

Integrative bargaining consisted of the following: (1) Collective bargaining is *both* a process of dividing revenue and creating mutual benefits. (2) During the process of bargaining, solutions can be found which benefit both employees and management. (3) Many collective bargaining issues can be settled so that each side gains at least something. (4) Collective bargaining can be a problem-solving process for many issues. (5) The results of collective bargaining can only benefit one side or the other (R).

Grievance to punish consisted of one item: The grievance procedure should be used to punish a supervisor.

Integrative contract consisted of one item: Practical solutions to specific work-related problems are more important than adhering to the letter of the contract.

Promotional opportunity consisted of one item: I am fairly likely to receive a promotion within the next two years.

Influence on employer consisted of the following: (1) Employees here have a lot of influence in what they do day-to-day. (2) Employees here have a lot of influence in changing how they do their work. (3) Employees here have a lot of influence in how work-related problems are solved.

Union decision making consisted of the following: (1) Union members here have a lot of influence in deciding which issues will be brought up during contract negotiations. (2) Union members here have a lot of influence in decisions of the Local X Executive Board. (3) Local X does an excellent job of selecting issues for contract negotiations. (4) The Union officers do *not* keep us informed about how they are handling union business (R). (5) Local X does a poor job of handling grievances (R).

Employment mobility consisted of the following: (1) It would be very difficult for me to find another job that is as good as the one I have now (R). (2) It would be very hard for me to leave this employer even if I want to (R).

Supervisor support consisted of the following: (1) My immediate supervisor treats all subordinates as equals. (2) My immediate supervisor is always fair with me. (3) My immediate supervisor stands up for me with "higher ups." (4) My immediate supervisor encourages me to participate in important decisions.

Steward effectiveness (rank and file only) consisted of the following: The stewards in my unit (1) can be trusted to represent workers here when dealing with management, (2) can be trusted to represent workers here when dealing with the Business Representative, (3) are helpful when employees have problems with our employer, (4) are skillful in handling grievances, (5) are always fair in handling grievances.

Union activities consisted of the following: (1) About how many issues of the Local X newspaper have you read *in the last year*? (a) none at all, (b) 1 or 2 issues, (c) 3 or 4 issues, (d) 5 to 7 issues, (e) 8 or 9 issues, (f) all of them. (2) About how often do you go to regional Union meetings?[a] (a) I never go to meetings (0%), (b) I sometimes go to the meetings (about 25%), (c) I go to about half the meetings (about 50%), (d) I usually go to more than half the meetings (about 75%), (e) I go to almost all the meetings (about 90–100%). (3) How knowledgeable are you about your collective-bargaining contract? (a) I don't know anything at all about what is in the collective bargaining contract, (b) I know a little about what is in the contract, (c) I know some of what is in the contract. (d) I know quite a bit of what is in the contract, (e) I know a lot about what is in the contract. (4) How many grievances have you filed in the past two years? (a) none, (b) one, (c) two, (d) three, (e) four or five, (f) six to eight, (g) nine to eleven, (h) twelve or more. (5) About how many grievances have you handled in the past two years? (stewards only) (a) none, (b) 1 or 2, (c) 3 to 5, (d), 6 to 10, (e) 11 to 15, (f) 16 to 20, (g) 21 to 25, (h) 26 to 30, (i) more than 30.

[a] The figures in parentheses following responses indicate the percentage of meetings attended.

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RESEARCH NOTES

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CONCESSION BARGAINING: THE MEANING OF UNION GAINS

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Recent changes in the economic environment of many unionized organizations have given rise to widespread concession bargaining on the part of unions. Research on this phenomenon has focused largely on the characteristics of those concessions and, more recently, on their economic significance to the firms involved (Becker, 1987). Interestingly, despite the implications of the term, concession bargaining has also included what appears to be union *gains*. In fact, some observers have suggested that the very character of those union gains signals a departure from the historical labor-management relationship (Bureau of National Affairs, 1982; Mills, 1983). At the very least, if concession bargaining is to have long-term consequences for union-management relations, such changes will be based on the "wide-ranging improvements [union security provisions, contingent compensation plans, participation in management decisions], or quid pro quos, that many unions have secured in return for agreeing to labor cost concessions" (Cappelli, 1984: 297).

The significance of those union gains and their long-term consequences, however, are not clear. Do they represent a substantial erosion of traditional areas of management rights in return for short-term economic concessions? Or are recent union gains largely symbolic, with little long-run cost to the firms involved? Although no direct measure of the impact of the gains is available, this study measured their indirect impact on the economic interests of firms.

The results reported here are part of a larger study of concession bargaining showing that during the period 1982–83, concessionary contracts increased shareholders' equity by 8 to 12 percent (Becker, 1987). On the average, therefore, shareholders benefited considerably from the wave of concession bargaining during that period. The 1987 study also examined whether concession bargaining resulted in a significant change in the business risk borne by shareholders and found none. Further, the study developed a simple model of the determinants of concession bargaining. The study's aggregate results were, however, mean effects and provided no insight into the sources

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of the considerable differences in the firm's experiences or the effects of any union gains during the study period. The purpose of this research note is to provide such an elaboration.

CONCESSION BARGAINING AND UNION GAINS

Although the characteristics of concession bargaining are well known (Kassalow, 1983; Mills, 1983), we know little about the effects of such concessions on the balance of power between the parties. One important theme in the literature on concession bargaining, however, is that unions usually seek a quid pro quo in return for concessions. For example, concessions may include wage and benefit reductions or freezes and two-tier wage systems, but concomitant union gains may include greater employment security, profit-sharing, and promises of future wage increases. Mills (1983) observed that in the recent round of concessionary bargaining the inroads of organized labor have simply taken a new form. In the past, management traded dollars to preserve management rights and is now reversing that position to maintain financial solvency. Edwin Miller, former chairman of the National Labor Relations Board, painted an even darker picture, claiming that recent concessions are "a shrewd trade-off" on the part of unions, reflecting a significant erosion of management rights (Bureau of National Affairs, 1982: 4). In a careful analysis of union gains under concession bargaining, Cappelli (1984) detailed how those gains might lead to greater union interest in management issues beyond labor relations and halt the decline of union penetration in many industries. For example, a close link between pay and profits will increase union interest in firm performance, and enhanced union security clauses and automatic recognition provisions will make it easier for unions to organize new plants.

However, Cappelli also noted that the gains often come at a price; they are most "likely to occur where the unions can deliver relatively large savings through concessions" (1984: 299). Since unions are political organizations, that is not surprising. Union leaders should be more likely to bring at least symbolic gains to workers as the economic value of a concession grows. The question is, however, whether such gains by unions are, as Mills and Miller seemed to suggest, more than symbolic. If in fact they do represent true gains at the expense of management rights, they should presumably have some future economic consequences for the firms involved. Alternatively, if the gains are largely symbolic, they should have little negative economic effect on the firms involved. This is not to say that union gains with no economic impact on a firm have no value to a union's members, only that such gains would not be likely to represent the kind of erosion or threat to management rights that has been suggested. The erosion hypothesis is simply less credible without evidence that union gains constitute significant economic losses for the firms involved.

METHODS

Measures

Economic impact. To determine whether union gains under concession bargaining have had any economic impact on the firms involved required a measure of their effect on both current and future profitability. Because capital markets are highly efficient, common stock prices are well established as unbiased estimates of the present value of firm profits, or net cash flows. Changes in the price of common stock (returns), therefore, can be taken as an indication of the direction and magnitude of changes in future profitability. The use of such a measure has allowed recent labor relations research to extend the literature concerning union effects to the level of individual firms and to organizational research issues as well.[1] For the purposes of this study, the capital market's reaction to the information that union gains have occurred in concession bargaining will be taken as evidence of the significance of those gains.

The conventional model of shareholder returns, known as the market model, posits only one systematic influence on period-to-period changes in stock prices: the changing fortunes of the market as a whole (Fama, 1976). Therefore, for a firm designated *i*,

$$(R_{it} \mid \textit{market return}) = \beta_0 + \beta_i R_{mt} + e_{it}, \tag{1}$$

where

R_{it} = the rate of return per share of stock between time t and $t-1$ for the *i*th firm,
R_{mt} = the rate of return on a value-weighted portfolio of stocks between time t and $t-1$, and
e_{it} = the random error term.

The market in this case is the aggregate response of all firms to changing economic conditions. β_i is a measure of the sensitivity of a firm's returns to those of the market as a whole and reflects the riskiness of an investment in firm *i* relative to all other firms. Absent unanticipated new information associated with firm profitability, the expected value of firm returns, or E (R_{it}), is computed as follows:

$$E(R_{it}) = \beta_0 + \beta_i R_{mt}. \tag{2}$$

In other words, the expected value of any deviations from the level of returns associated with market variation would be zero. These deviations, known as abnormal or excess returns, are typically characterized by considerable sampling variance. An abnormal return outside the range of normal sample variation would only be expected when the market receives new information that it believes has a bearing on a firm's profitability.

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[1] For a review of this literature and a more detailed explanation of the application of this methodology to labor relations issues, see Becker and Olson (1987). Also see Reinganum (1985), Worrell, Davidson, Chandry, and Garrison (1986), and Montgomery, Thomas, and Kamath (1984) for applications of the capital market literature to organizational research.

Union concessions and gains. Contract settlement data from contracts publicly identified as concessionary were coded to reflect the types of union concessions and gains that characterized each settlement. Although these measures are quite crude, they do offer an opportunity to examine the meaning of union gains during the study period. On the basis of the description of the settlement terms, I classified each settlement into eight categories of concessions and nine categories of gains. Table 1 reports the categories and their incidence. The categories are not mutually exclusive, and most reports included several incidents in each category. The data provide only gross measures of the actual concessions and in many cases list a variety of concessions (such as wage freeze, wage reduction, benefit reduction) or gains for the same firm. I considered each a separate concession or gain, although in many cases more information would probably reveal close links among several of the categories.

Data

The data are based on concession incidents collected nationwide by the Bureau of National Affairs (BNA) for the years 1982–83.[2] Drawing on a wide range of published sources, the BNA collected summary information on the incidents, categorizing them as concessionary on the basis of the public

TABLE 1
Contract Concessions and Union Gains[a]

Union Concessions	Percentage of Contracts with Clause	Union Gains	Percentage of Contracts with Clause
Rules change	1.4	Increased wages and benefits	15.4
Wage and benefit reduction	43.6	Increased wage benefits	40.8
Wage and benefit postponement	50.7	Implicit employment security	26.7
Wage and benefit freeze	9.8	Explicit employment security	32.3
Fringe benefit only: reduction	46.4	Employer will pay back benefit reduction	2.8
Fringe benefit only: freeze	43.6	Profit sharing	7.0
Two-tier wage system	29.5	Labor-management committee	4.2
Labor utilization	2.8	One-time bonus	2.8
		No gains	16.9

[a] N = 70.

Source: Unpublished 1982 and 1983 data on concession bargaining from the Bureau of National Affairs.

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[2] The data are available from the Bureau of National Affairs. It has not been published.

description by the parties. Although these are the most comprehensive data available on concession bargaining during this period, they represent neither a random sample of all concession bargaining agreements nor an exhaustive collection of the entire population of such agreements. The data no doubt overrepresent large, publicly owned firms.

For the purposes of this study, I considered a round of negotiations concessionary on the part of the union if the parties publicly described it as such in published accounts of the settlement. A wide range of incidents were reported, but only contracts that eventually culminated in a contract without a strike or plant closing were included in the analysis. In addition, excluding firms with multi-employer contracts or those that were not listed on the New York or American stock exchanges further reduced the final data set, which included 70 concession contracts. Shareholder returns were based on data taken from the files of the Center for Research on Security Prices at the University of Chicago.

Analysis

For each firm, the cumulative excess return, defined as the daily excess returns summed across a 121-day period surrounding the announcement of a concession contract, was regressed on the presence or absence of the eight union concessions and nine union gains:

$$CER_{it} = c_0 + \sum_{a=1}^{8} c_a \text{ Con} + \sum_{b=1}^{9} c_b \text{ Gain} + u_{it}\,, \tag{3}$$

where

CER = the cumulative excess return for the ith firm over the 30 trading days before the concession, the day of the concession, and the 90 trading days after the concession,
Con = a vector of eight dummy variables indicating the presence or absence of various union concessions, and
Gain = a vector of nine dummy variables indicating the presence or absence of various union gains.

Two observations on the specification of Equation 3 are appropriate. First, though it is a rather simple model, given the nature of excess returns, it is well specified. For example, there are no obvious omitted variables that might bias the c_a and c_b estimates. For such a bias to exist, any omitted variable would have to be correlated with *both* CER and the independent variables, which would require that another unanticipated event with profit implications occurred at the same times as the concession agreements studied and that the effects on CER be consistently positive or negative. Second, since the categories are not mutually exclusive, it is appropriate to include all categories as independent variables.

RESULTS

Table 2 reports the intercorrelations of all variables reflecting their order in Equation 3 and Table 3. Unfortunately, there was no clear relationship between specific contract characteristics and shareholder gains. Rather than try to make more of the analysis than the data will allow, I simply aggregated concessions and gains and evaluated them as two separate groups.[3] In both cases, a joint F-test indicated that they had a statistically significant ($p = .01$, two-tailed test) effect on the excess returns for firms reporting concession agreements. A simple way to assess the economic significance of these two groups is to evaluate them at their respective means. The coefficients of each characteristic, except "no gains," was multiplied by the incidence of that characteristic and summed. The aggregate influence of concessions, for example, was calculated as $a_1X_1 + a_2X_2 \ldots + a_8X_8$. The result of this calculation indicated that, of the overall 12 percent increase in shareholder equity in the firms studied, 3.8 percent derived from the concessions and 7.7 percent was attributable to the union gains.

Table 3 gives the results of separate regression equations including just the concessions (column 1), just the union gains (column 2), and the complete specification of Equation 3 (column 3). Not only are both the concessions and gains statistically significant (column 3) when taken together, as noted above, but each of the groups is also statistically significant in columns 1 and 2, respectively.

DISCUSSION

At first these results seem astonishing. They suggest that firms benefited from union gains. However, if we recall the earlier discussion of the meaning of union gains and the measures involved, the results are not so surprising. The measures reflect the presence of union concessions and gains rather than their value. As a result, even though two firms have equal observed concessions—for instance, both report benefit reductions—the value of those concessions is not necessarily equal. In fact, we would expect unions granting the concessions of greatest value to be more likely to demand something to take back to their members, a union gain. The effects observed for the union gains simply reflect the unmeasured magnitude of the concessions. In other words, across firms with specific reported concessions, the unobserved value of those concessions varies. As a firm went farther out on the unobserved distribution of concession value, winning greater concessions, unions were more likely to demand and win gains. The reported difference in the

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[3] There are several reasons for only discussing the results in aggregate terms. First of all, because the categories are not mutually exclusive, they are difficult to interpret individually in a meaningful manner. Second, there is no theoretical basis for predicting the relative magnitude or importance of any particular variable. To discuss just the significant results post hoc would be exaggerating the state of knowledge in this area. Finally, to focus on specific results entails a risk of overstating the importance of a particular concession or gain in the data set. For example, although both profit sharing and labor-management committees have very sizable individual effects, they are very rare occurrences in the data.

TABLE 2
Correlation Matrix of Variables[a]

Variables	Cumulative Excess Returns	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Cumulative excess returns																	
1. Rules change	−10																
2. Wage and benefit reduction	−09	−11															
3. Wage and benefit postponement	14	−12	−21														
4. Wage and benefit freeze	20	−04	−29*	−15													
5. Fringe benefit reduction	−06	−11	−42**	−28*	35**												
6. Fringe benefit freeze	28*	−11	−15	36**	−01	03											
7. Two-tier wage system	−11	−08	−38**	−16	51**	63**	−14										
8. Labor utilization	−28*	−02	19	−17	−06	01	02	−11									
9. Increased wages and benefits	07	−05	−02	−16	−02	03	−09	12	−08								
10. Increased future wages and benefits	−05	−05	−22	19	25*	23	02	23*	−07	−19							
11. Implicit employment security	−17	14	−10	30**	−18	−08	−27*	−16	03	−37**	28*						
12. Explicit employment security	−17	−07	−02	15	01	14	17	17	−10	−27*	18	−05					
13. Employer will pay back benefit reduction	07	17	06	02	−03	02	36**	−18	25	−31**	−13	−03	−15				
14. Profit-sharing	−03	−02	−15	17	23	01	19	08	−03	−08	16	−14	28*	−12			
15. Labor-management committee	40**	−03	−13	16	09	08	20	−06	−05	−12	−12	−01	−17	16	05		
16. One-time bonus	34**	−03	10	−07	−07	−20	10	−14	−04	−10	−09	−18	−13	−15	−04	22	
17. No gains	−04	−02	−15	17	−06	01	02	08	−03	−08	16	03	−10	06	−03	−05	−04

[a] Decimal points are omitted; $N = 70$.

*$p < .05$

**$p < .01$

TABLE 3
Results of Regression Analysis[a]

	Cumulative Excess Return[b]		
Independent Variables	**Concessions Only**	**Gains Only**	**Combined Model**
Union concessions			
Rules change	−.335		−.281
	(.362)		(.358)
Wage and benefit reduction	−.038		−.014
	(.104)		(.101)
Wage and benefit postponement	−.030		.045
	(.101)		(.113)
Wage and benefit freeze	.384**		.383**
	(.161)		(.166)
Fringe benefit reduction	−.040		−.002
	(.119)		(.121)
Fringe benefit freeze	.188		.115
	(.091)		(.109)
Two-tier wage system	−.216*		−.175
	(.130)		(.130)
Labor utilization	−.651**		−.608**
	(.255)		(.248)
Union gains			
No gains		.138	.163
		(.147)	(.142)
Increased wages and benefits		.093	.004
		(.124)	(.127)
Future increase in wages and benefits		−.071	−.008
		(.102)	(.116)
Implicit employment security		−.044	−.049
		(.109)	(.111)
Explicit employment security		.080	.080
		(.103)	(.114)
Employer will pay back benefit reduction		.023	−.160
		(.263)	(.262)
Profit sharing		.492***	.331*
		(.168)	(.171)
Labor-management committee		.509**	.511**
		(.228)	(.225)
One-time bonus		−.060	−.031
		(.252)	(.249)
Constant	.139	.043	.013
	(.124)	(.109)	(.148)
R^2	.255	.269	.442
$\bar{R}^2$	.159	.162	.263

[a] Standard errors are in parentheses.

[b] $N = 70$ for concessions, gains, and combined model.

* $p < .05$

** $p < .01$

*** $p < .001$

effects of the concessions and gains is simply the difference in the mean concession value for firms winning few concessions and firms winning large concessions, with associated union gains.

There are three other plausible explanations for the reported results. First, union gains resulting in greater employment stability might have had the effect of shifting a greater share of the business risk of firms to shareholders and of thereby increasing β_i above the level estimated in Equation 1. The benefits to shareholders from the concessions would be overstated, since the returns would rise to compensate shareholders for the increased risk rather than the union concessions. However, a test of the β_i's before and after the announcement of concessions showed no significant difference, statistically or economically (Becker, 1987).[4] Second, the number of union gains rather than their presence might have better captured the influence of the value of these benefits. A test of that hypothesis revealed absolutely no relationship between the number of union gains and changes in shareholder equity. The data were, however, consistent with the original interpretation, since there was a positive correlation between the number of concessions and number of gains reported in the agreements ($r = .313$, $p = < .01$).

Finally, the language of concession bargaining and much of the previous discussion of bargaining outcomes casts negotiations in a largely distributive framework. The so-called erosion of management rights suggests that union gains occur at the expense of management. A symbolic interpretation suggests that an absence of management loss as indicated by reduced shareholder equity in the presence of reported union gains is evidence that those gains have had no real economic value to union members. However, it is also possible that, during the period studied, a much greater degree of integrative bargaining characterized negotiations than had been true in the past. As a result, union gains, although continuing to benefit workers, did not come at the expense of management interests. For example, profit-sharing and the establishment of labor-management committees may actually signal improved firm performance in the future if workers' interests are more aligned with those of shareholders and workers have greater involvement in management decision making. In such a case, union gains could certainly not be considered symbolic, although the present study provides no evidence of the value of such gains to union members.

Although the integrative explanation is attractive and may explain the results in part, the magnitude of management gains reflected in increased shareholder equity makes it difficult to imagine joint gains by workers of substantial economic value. Moreover, it is difficult to imagine how, during negotiations at earlier times, management and labor would have failed to identify opportunities that apparently have very significant benefits. Nevertheless, this explanation cannot be excluded empirically.

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[4] These tests estimate β_i in Equation 1 for the 120 days before the period surrounding the announcement of a concession agreement and compare this estimate to β_i estimated during the subsequent event period.

CONCLUSIONS

The question guiding this investigation was whether recent union gains are largely symbolic or represent meaningful changes in the labor-management relationship. The results reported do not support the idea that union gains obtained through concession bargaining represent a substantial erosion of management rights, if those rights have any economic value to a firm. Granted, the evidence is indirect. The erosion hypothesis would predict union gains as an outcome of negotiations that also led to the most significant union concessions, which is what I observed. However, if such an erosion of management rights were economically meaningful to firms, now or in the future, investors would include that information in their evaluations of firm profitability. The value of concessions to the firms would thereby decrease, and the effect of the union gains would not be in the direction observed.

The exact meaning of the positive relationship between union gains and shareholder equity is not entirely clear. One interpretation is that the presence of such gains is largely symbolic and their positive economic value to a firm represents nothing more than the unmeasured value of the concessions to which they are linked. Another, less plausible, explanation is that the union gains analyzed represent the joint benefits of integrative bargaining, with the associated direct implications for profits. Unfortunately, it is not possible to choose empirically between these competing explanations given the available data.

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EFFECT OF STRIKE ACTIVITY ON FIRM VALUE

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Recently, there have been calls for a closer working relationship between researchers in management and in finance on problems that are on the interface between the two disciplines (Bettis, 1983; Jemison, 1981; Peavy, 1984). This study examined the stock market's reaction to a labor management problem, strikes.

Economists have long focused attention on strikes as classic examples of a breakdown in collective bargaining. A strike can be viewed as an investment—a giving up of current resources in the hope of gaining larger returns in the future. Eaton (1972) showed that strikes tend to be good investments for unions and poor investments for corporations. If strikes are negative corporate investments, a reduction in firm value should be reflected in negative stock returns during the period of a strike. Managers are hired to run companies for stockholders, so the effect of strikes on wealth has important implications for managers during periods of labor negotiations.

RESEARCH ISSUES

A considerable amount of research has focused on the antecedents of strike activity (Ashenfelter & Neumann, 1969; Chermesh, 1982; Flaherty, 1983; Kaufman, 1981, 1982, 1983; Leigh, 1983; Paldam & Pedersen, 1982; Scully, 1971; Vanderkamp, 1970; Weintaub, 1966). Other research has focused on the results of strikes from an economy-wide point of view (Christenson, 1953; Neumann & Reder, 1984).

Still other studies have focused on the costs of strikes at the micro or firm level. Imberman (1979) divided strike costs into three categories. First are prestrike costs, including productivity lost because employees are disgruntled and revenues lost because customers who are faced with the likelihood of a strike diversify their suppliers. Second are strike costs that include profits lost because of a decline in revenue and executive time lost when executives attempt to operate a firm themselves. Third are long-term costs, which include lost employees, poststrike overtime, and potentially permanent loss of customers. Gandz, DuMont, and Lord (1980) pointed out additional costs, including the costs of prestrike inventory build-ups, shutdowns and start-ups, sabotage, negotiating, and training strike breakers. Not all of those costs can be measured, so the exact cost of any particular strike, or of strikes in general, cannot be precisely determined.

Eaton (1972) found that for employees, the value of the benefits lost during strikes was less than the present value of higher poststrike wages. When these lost benefits are combined with the costs described by Imberman (1979) and Gandz and colleagues (1980), it appears likely that strikes in general are quite costly to firms.

Miller and Modigliani (1961) asserted that, in order for a firm's value to grow, it must have positive investment strategies, and that firm value depends on the expected future earnings stream of the firm. If strikes reduce a firm's expected future cash flows, its value should decline around the period of strike activity. The implication for management is that, in some instances, forcing a union into a strike may not be an optimal decision.

This study extended previous research by Neumann (1980) and Becker and Olson (1986). Neumann found that strike starts were associated with negative returns and that strike conclusions were associated with positive returns. Becker and Olson confirmed Neumann's findings for strike starts but also found that companies settling before strikes occurred had little prestrike reaction. The current study reexamined the same issues and extended them by examining strike length as a variable.

Our central hypothesis is that the stock market will view the announcement of a strike as a negative event. In other words, the start of a strike is a signal to the stock market that future earnings may be impaired, and this signal may be associated with negative stock returns. Second, an announcement that a strike is over may be a signal to the stock market that the period of strike-induced impairment of earnings is over, so positive returns should be associated with the conclusion of a strike. Third, we hypothesize that long strikes will have a greater effect on firms' cash flows than short strikes. Thus, the total negative effect of strikes should be larger when strikes are lengthy. Finally, these results will be compared to the results obtained using data from a group of firms that avoided strikes by settling with their unions before strikes began. This comparison will show that firms that settle before allowing strikes are not viewed as negatively in the stock market as those that have strikes occur.

METHODS

Study Population

The *Wall Street Journal Index* was monitored for the years 1978–83 to find announcements of strikes. We found 249 strikes for which both beginning and end were in the study's period. For a strike to be included in the study population, the affected firm's common stock had to have been listed on either the American or New York Stock Exchanges during the study period. This restriction ensured that a stock traded frequently enough to allow us to obtain reliable estimates for the market model parameters and permitted use of the CRSP tapes from the Center for Research in Security Prices at the University of Chicago. The study population was further restricted by eliminating firms that had overlapping strikes; we did so because the individual effects of two, or more, strikes may not be discernible.

The final population studied contained 109 strikes. The strikes lasted an average of 46 trading days, but the range was 2 to 347 trading days. Using the same restrictions on data, we gathered a group of 43 companies that settled their labor contracts before a strike occurred.

Data Analysis

Standard event methodology was used to determine the stock market's reaction to strike-related activity. The methodology, summarized here, is explained more completely in the appendix to a previous work (Worrell, Davidson, Chandy, & Garrison 1986).

With event methodology, a security's actual returns are compared to predicted returns. A stock return is a dividend-adjusted percentage change in stock price. The predicted returns are found by regressing, during a prestrike period, the security's actual daily returns against the overall return of the market. The regression parameters are then applied to the actual market returns around the strike event to obtain the predicted returns.

The differences between an actual return and a predicted return is called an abnormal return. We averaged abnormal returns across firms each day over a period of time around the strike events. Cumulative abnormal returns (*CAR*s) were computed by summing the average abnormal returns over various intervals. To determine if the *CAR*s are significantly different from 0, we conducted *t*-tests on them over those intervals.

RESULTS

Overall Results

Table 1 summarizes the results for the study population ($N = 109$). The *CAR*s for the starts of the strikes appear in the first set of columns. Over the 30 trading days immediately preceding the strikes there was a negative *CAR*, but it was statistically insignificant. However, the *CAR*s over the intervals −10 to 0 and −5 to 0 were negative and significant at the 0.05 and 0.01 levels, respectively. A large portion of the negative drift over these intervals occurred on day −1, but there did appear to be a prestrike negative drift in the return series over the period 5 to 10 days before the strikes.

The *CAR* on day −1, the day before the strikes started, was −.0078 and was statistically significant at the .001 level. Whereas the strike announcements in the *Wall Street Journal* occurred on day 0, news stories that were in

TABLE 1
Cumulative Abnormal Returns Surrounding Strike Announcements and Settlements[a]

Interval	Strike Starts[b]		Strike Settlements[b]		Strike Averted	
in Days	*CAR*	*t*-Test	*CAR*	*t*-Test	*CAR*	*t*-Test
−30 to 0	−.0149	−1.43			−.0226	−0.29
−10 to 0	−.0130	−2.05*	−.0004	−0.54	.0028	0.62
−5 to 0	−.0124	−2.92**	.0015	0.26	.0034	1.06
−3	.0010	0.53	.0004	0.17	.0014	0.81
−2	−.0014	−0.73	−.0009	−0.39	−.0002	−0.18
−1	−.0078	−4.11***	.0033	1.42	.0020	0.71
0	−.0005	−0.26	.0034	1.46	.0028	0.78
1	−.0013	−0.69	−.0010	−0.43	.0011	0.13
2	.0029	1.53	−.0039	−1.67	.0059	1.39
3	−.0014	−0.73	−.0011	−0.47	.0070	1.59
0 to 5	−.0023	−0.54	−.0030	−0.53	.0187	1.40
0 to 10	.0068	−1.13	−.0094	−1.28	.0120	1.09
0 to 30			−.0086	−0.66	−.0056	−0.07

[a] The regression model used to predict returns is often called the market model. McDonald and Nichols (1984) showed that using alternate predictive models is valuable to confirm market model results. We also used the average return model; the results, which confirmed those of the market model, are not shown here. Complete tables are available from the authors.

[b] The 0 to 30 interval for strike starts and the −30 to 0 interval for strike settlements are not shown because they overlap for more than half the data and are therefore difficult to interpret.

* $p < .05$
** $p < .01$
*** $p < .001$

the *Wall Street Journal* appeared over the news wire on the preceding day. Thus, sophisticated investors who had access to news wire stories would have had the information on day −1. The significant reaction on day −1 was therefore not unexpected. The reaction to the announcement was negative, and the negative return is consistent with the hypothesis that strikes are negatively valued investments representing reduction in a firm's expected cash flows.

The *CARs* for the strike settlements and test statistics appear in the second set of columns of Table 1. On days −1 and 0 there were large positive, but statistically insignificant, *CARs*. The returns on the days following settlements were negative and statistically insignificant. There were both positive and negative returns around the strike settlements, but these reactions were not statistically different from 0.

In the third set of columns for Table 1 are the results for the group of firms that settled with their unions and averted strikes. There were no statistically significant results for this group. Thus, the market's reactions to a strike and to a settlement before a strike were clearly different.

The *CAR*s for various subintervals computed for strikes of different lengths and computed relative to both the beginnings and the ends of the strikes appear in Table 2. The *CAR* over the period −2 to 1 was more negative for the long strikes than for the short strikes. The data are consistent with the hypothesis that the market participants anticipated longer and potentially more costly strikes.

Over the interval −1′ to 0′ (the prime sign signifies time relative to strike settlement) the data suggest that the market reacted more positively to the settlements of long strikes than to those of short strikes. The *CAR* for strikes lasting 20 or fewer trading days was .0048, a statistically insignificant value. If strikes lasted between 21 and 38 days, or 39 or more days, the values for *CAR* were .0065 and .0128, respectively, and these were significantly positive.

TABLE 2
Cumulative Abnormal Returns Computed Around Strike Dates

Strike Length	Intervals[a]				Average Per-Day Change 0 to 0′[b]
	−30 to −2	−2 to 1	0 to 1	−1′ to 0′	
20 days or less	−.0537	−.0015	.0120	.0048	.0027
	(−2.57*)	(−0.38)	(3.18***)	(1.28)	(1.01)
21 to 38 days	.0425	−.0068	−.0012	.0065	.0004
	(1.84)	(−1.04)	(−0.41)	(2.05*)	(0.09)
39 and more	.0087	−.0142	−.0096	.0128	−.0001
	(0.42)	(−2.17**)	(−2.55)	(3.40***)	(−0.07)

[a] An interval date signified by a digit is time relative to the start of a strike. An interval date signified by a digit with a prime sign is time relative to the conclusion of the strike. The number in parentheses is the *t*-statistic on the *CAR*.

[b] The *t*-test for the interval 0 to 0′ is not the same test used throughout the study because the interval 0 to 0′ is not a uniform length across companies. First, we computed the average *CAR*:

$$AVECAR_i = \frac{CAR_i^{0 \text{ to } 0'}}{m},$$

where m = the number of days for company i between 0 and 0′. The total population's standard deviation is computed for $AVECAR_i$. The test statistic is found by summing $AVECAR_i$ across the companies in the subset and dividing by the standard deviation:

$$t = \frac{\sum_i AVECAR_i}{\text{s.d.}_{AVECAR}}$$

To confirm that the results in this column are insignificant, we performed a binomial test, whose results indicated that the number of positive individual company *CAR*s over the interval 0 to 0′ did not differ significantly from the number of negative *CAR*s.

* $p < .05$
** $p < .01$
*** $p < .001$

Each strike lasted a different length of time. We computed and averaged the total *CAR* from 0 to 0′ across the number of trading days. Those averages were then averaged for each of the strike-length intervals. The *CAR* averages for the period between strike onset and settlement were all small and statistically insignificant but were smallest for the longest strikes.

DISCUSSION

This study found that the beginning of a strike is associated with statistically significant, negative abnormal returns. In fact, the abnormal returns occurred on the days before the *Wall Street Journal* announcements. The market's quick reaction to the news of a strike has important implications for market efficiency. The market reacts when the information becomes public to the sophisticated investors who regularly monitor the wire service.

The market reacted very slightly over the period immediately before a strike's onset. Thus, there is some evidence that market participants are able to predict strikes. That likelihood is consistent with the findings of Becker and Olson (1986). However, the strong negative return on day −1 shows that strikes are not completely predictable. If strikes were predictable, the market would react before the onset of a strike, before day −1. Our results indicate that the market reacts more severely to strikes that subsequently turn out to be long. This reaction occurs before the length of the strike is known with certainty. If we assume that long strikes are more costly, the results imply that market participants are able to foresee a strike's duration and react accordingly. When strikes were averted, the market exhibited random movement.

Eaton (1972) suggested that strikes are negative corporate investments, and others (Gandz et al., 1980; Imberman, 1979) have described many costs associated with strikes. The current findings suggest that the market reacts negatively, and statistically significantly, to a strike's onset; positively, but insignificantly, to the announcement of a strike's conclusion; and not at all when a strike is averted. Since the positive reaction to the announcement of a strike's end is not as large as the initial negative reaction, there appears to be a permanent loss to the shareholders of companies that experience strikes. Furthermore, the results suggest very little material reaction during the period between a strike's inception and its termination. The loss to shareholders is not made up during a strike nor at the conclusion of a strike. Since the cost of settlement may not be completely known at the time a strike is settled, the negative nature of the market's reaction may be short-term. Whether strikes are a negative investment in the long run should be the subject of future research.

However, the short-run implications for management are clear. Strikes are costly to the common stockholders of firms because stock returns fall around the time of strike announcements, and managers should consider this negative reaction when conducting labor negotiations. Second, since long strikes are more costly to shareholders, managers should consider that fact during negotiations concurrent with strikes.

This study extends previous research because both strike length and the market's reaction during the time between strike onset and cessation were examined. Although the findings reported here may be specific to this study population, they do confirm the results obtained by both Neumann (1980) and Becker and Olson (1986). The study is further limited by the time analyzed (1978–83). Becker and Olson (1986: 434) showed that the market's reaction to strikes may have changed from the period 1963–75 to 1975–82. The effects of strikes in their later period were still statistically significant and negative, but they were not as negative as in the early period. Our study period corresponds somewhat to their later period, and our results confirm that the market still reacted negatively to strike announcements. Also, there was no difference between the market's reaction to strikes in the different years in our study. Whether the market's reaction to strikes has changed in more recent time periods is a question for further research.

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EFFECTS OF EMOTIONAL DISABILITY AND CLEAR PERFORMANCE STANDARDS ON PERFORMANCE RATINGS

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Reviews of the performance appraisal literature continue to point out that appraisals are subject to a variety of biases and are simply not very accurate (DeNisi, Cafferty, & Meglino, 1984; Landy & Farr, 1980). Nonetheless, there is a need to identify and understand sources of inaccuracy and bias since many organizations have no viable alternative and continue to make important personnel decisions on the basis of performance appraisals. One specific line of research in this area has focused on nonperformance characteristics of ratees that affect ratings, such as gender (Bigoness, 1976; Mobley, 1982; Rosen & Jerdee, 1974), race (Hamner, Kim, Baird, & Bigoness, 1974), and age (Schwab & Heneman, 1978). The present study continued in that tradition with a different class of ratee characteristics, referred to as ratee disability. Specifically, this study focused on an emotional disability, severe depression.

The importance of research on reactions to emotionally disabled workers was underscored by the passage of the Rehabilitation Act of 1973. More recently, a National Institute of Mental Health survey (*Time*, 1984) indicated that at least 20 percent of the American adult population is afflicted by some mental illness, a large proportion having an emotional disability like depression. Not only is emotional disability widespread, but as Goffman (1963) suggested, people with mental illness are associated with a variety of negative personal character deviations. Since there is reason to believe that emotional disability might operate in a somewhat unusual fashion, it is useful to review prior research that has examined reactions to disabled individuals in both work and nonwork settings.

Effects of Disability on Ratings

Research investigating ratee characteristics as sources of rating bias has generally shown that employees who are members of minorities, or outgroups, based on race, gender, or age tend to be rated less favorably than comparably performing members of majority groups. Since it is reasonable to assume that most employees and supervisors are not disabled, we might expect disability effects to parallel other biasing effects. Considerable evidence supports such an expectation. Investigators have found that physically disabled people are generally perceived less favorably than nondisabled people (Smith-Hanen, 1976; Wright, 1960) and are seen as possessing different personality traits, moral characteristics, and social attitudes (Comer & Paliavan, 1975; Weinberg, 1976). Furthermore, several studies have suggested that both physically and emotionally disabled persons may be targets of discrimination in a variety of employment decisions (Clarcq, 1973; Olshansky & Unterberger, 1965; Peckham, 1968; Williams, 1972).

Despite this evidence, it is not at all clear that disability is just another ratee characteristic, similar to race or gender. For example, Hastorf, Northcraft, and Picciotto (1979) reported an upward bias in the performance feedback given to disabled workers. Also, one experimental test of discrimination toward disabled workers (Krefting & Brief, 1976) found little effect for a disability (paraplegia) on a variety of evaluative criteria for a typing position. It is interesting that the apparent conflict in findings concerning bias toward disabled workers is quite consistent with the finding that most people are emotionally ambivalent towards the disabled (Gergen & Jones, 1963; Katz, 1981). They may view disabled workers as out-group members and so treat them in a discriminatory way but at the same time feel a need to be fair and unprejudiced and therefore attempt to help disabled workers. In other words, the general belief would be that disabled people are less capable of doing a job, yet deserve a break because of their disability. In such a context, we can easily imagine that good performance exhibited by a disabled worker would be especially prone to a positive bias in evaluation because it was unexpected, given the barriers the worker had to overcome to achieve it (Leventhal & Michaels, 1971).

Focus of the Present Research

Videotapes were used in two laboratory experiments to examine the extent and nature of bias toward emotionally disabled workers in performance appraisals. The first study was simply designed to test whether such bias was negative or positive. The second study expanded the investigation by examining whether any bias toward the disabled could be eliminated or reduced simply by providing raters with task-related information in the form of clear performance standards. Previous researchers have suggested and demonstrated the same line of reasoning with regard to other forms of bias (Dipboye, Fromkin, & Wiback, 1975; Renwick & Tosi, 1978; Rose & Andiappan, 1978; Terborg, 1977), which led us to predict that any bias found in study one would decrease in study two.

Although laboratory experiments lack the realism of field studies, the control afforded by the laboratory was critical for establishing the relative roles of ratee disability and performance standards. Mobley's (1982) finding that race and gender effects are less powerful in field settings than they are in lab settings made that an especially important consideration. Further, although laboratory experiments may lack the external validity of actual ratings, since there is an absence of many contextual factors that could influence ratings, they probably do an acceptable job of modeling the judgment processes that underlie making ratings (Murphy, Herr, Lockhart, & Maguire, 1986). Thus, the laboratory seemed an ideal setting for conducting the present research and examining the nature of raters' judgments regarding disabled workers.

STUDY ONE

Subjects and Procedures

Subjects were 60 undergraduate students (31 women) enrolled in management courses. Participation was voluntary, with no offer of compensation or extra credit. Since preliminary analyses indicated no gender differences in ratings ($F_{1,55} < 1$, n.s.), all results reported are for the entire group.

Subjects were randomly and equally assigned to one of two experimental conditions. They reported to a room in groups of 10 and were told they would view a videotape of three white men who had just completed a carpentry training course. The tape depicted each worker (described and identified by a fictitious name) performing a sequence of four basic tasks: sawing, sanding, fastening, and staining. We used carpentry tasks in this study because of the familiarity people have with such tasks as well as their obvious association with a specific occupation. Subjects rated each worker on each task and rated each worker's overall performance. A slight pause followed each task to give the subjects time to rate the worker's performance. The total performance sequence for each worker lasted about two minutes. The order of presentation of workers was varied, with the same sequence followed for each group of 10 subjects. After viewing the tape and completing the necessary appraisal forms at separate desks, subjects were debriefed, thanked, and dismissed.

Experimental Conditions and Dependent Variables

The two experimental conditions were created by varying one independent variable: ratee disability. We manipulated the variable through a cover letter that provided the subjects with a fictitious rationale for the study. Half received a letter from the fictitious Professional Rehabilitation Services in New York, typed on letterhead prepared for this study. The letter indicated the ratees were disabled, stating that:

> The three individuals you will rate are from a community mental health center. The individuals have been hospitalized over the past two months due to a disabling mental illness. Each individual suffered from severe depression with suicidal tendencies, which are currently controlled by medication and weekly therapy. In conjunction with therapy, the individuals have recently completed a carpentry work adjustment program to help them overcome their mental illness disability and return to productive employment as members of their community.

The remaining subjects received a letter from Professional Employment Services, also on the letterhead, stating that the three men had just completed a carpentry training course.

In addition, the proficiency levels of the three ratees were manipulated as follows: one ratee performed three of the four tasks correctly (75% effective), one performed two tasks correctly (50%), and the third performed only one task correctly (25%). The manipulation was possible because the ratees portrayed on the tapes were actors who had completed a carpentry course and were performing according to a script prepared by one of the authors and the carpentry course instructor. We carefully pretested each segment to ensure that student raters could identify correct and incorrect incidents of performance for each task. Thus, the overall design was a 2 × 3 design, with a between-subjects factor of disability status (disabled vs. nondisabled) and a within-subjects factor of ratee proficiency (75, 50, or 25 percent effective). The dependent variables were the four individual task ratings and the single overall rating made by the subjects. They made all ratings on 5-point scales anchored at each point and ranging from poor performance (1) to outstanding performance (5).

Results

Table 1 reports the mean overall performance rating and the mean task ratings for each cell in the design. We tested the main hypothesis using a

2 × 3 repeated-measures ANOVA with ratee proficiency as the within-subjects factor and overall performance rating as the dependent variable. The results revealed a main effect for disability status ($F_{1,58} = 7.18, p < .01; \eta^2 = .11$), with no significant interaction with proficiency. Examination of the means indicated that, at all proficiency levels, disabled workers were rated significantly higher than nondisabled workers. There was also a main effect for ratee proficiency ($F_{2,57} = 41.48, p < .001$), which essentially served as a manipulation check. Post hoc tests indicated that ratings for all three performance levels differed significantly from each other.

A 2 × 3 MANOVA using the specific task ratings as dependent variables provided additional evidence that subjects rated disabled and nondisabled workers differently ($F_{4,55} = 2.35, p < .07$). Subsequent univariate analyses (ANOVAs) on each specific task rating indicated that disabled workers were rated significantly higher than comparably performing nondisabled workers on sawing ($F_{1,58} = 6.51, p < .05$), sanding ($F_{1,58} = 3.83, p < .05$), fastening ($F_{1,58} = 4.23, p < .05$), and staining ($F_{1,58} = 7.36, p < .01$). Also, supplementary analysis revealed that raters were able to differentiate between incidents of correct and incorrect performance exhibited by the same ratee regardless of the ratee's proficiency level or disability status. In every case, disabled workers were rated more favorably than nondisabled workers, which clearly

TABLE 1
Mean Performance Ratings and Standard Deviations: Study One

	Overall Performance Rating[c]		Specific Task Ratings							
			Sawing		Sanding		Fastening		Staining	
Disability Status[a]	Means	s.d.	Means	s.d.	Means	s.d.	Means	s.d.	Means	s.d.
No disability										
Proficiency level[b]										
25% effective	2.74	0.68	4.03	0.81	2.63	0.89	2.50	0.90	2.37	1.13
50% effective	3.14	0.61	3.17	1.02	3.07	1.01	2.77	1.16	3.70	0.87
75% effective	3.64	0.75	3.33	0.96	2.83	1.17	4.03	0.85	3.73	0.98
Disability										
Proficiency level[b]										
25% effective	3.11	0.87	4.40	0.67	2.73	1.01	2.90	1.12	3.10	1.03
50% effective	3.42	0.67	3.37	1.16	3.50	0.94	2.97	1.24	4.03	0.73
75% effective	4.07	0.46	4.03	0.89	3.33	1.15	4.70	0.60	4.07	0.74

[a] For the disability status effect for each dependent variable, all Fs > 3.5, p's < .05. For disability status × proficiency level, all Fs < 2.0. Each disability status condition included 30 subjects.

[b] 25% effective = The sawing task performed correctly, the other three incorrectly.
50% effective = The sawing and staining tasks performed correctly, the other two incorrectly.
75% effective = The sawing, fastening, and staining tasks performed correctly, the sanding task incorrectly.

[c] The results are based on a single rating of overall performance.

indicated that disability status was a source of bias in ratings. That is, raters apparently saw a need to give a break to disabled workers and consistently rated them higher than nondisabled workers performing at the same level of proficiency.

STUDY TWO

Given the results of study one, it was especially interesting to explore whether providing raters with clear performance standards would eliminate the positive bias that might otherwise have been displayed toward emotionally disabled workers. In this study, we gave subjects written performance standards.

Previous research on gender bias has found that providing additional performance-related information reduces or eliminates that bias (Terborg, 1977). Thus, we designed the second study, which compared ratings under conditions in which performance standards were either specified or unspecified to the raters, to test the hypothesis that disability bias would significantly decrease when raters had clear performance standards available.

Subjects and Procedures

A second group of 120 undergraduate management students (52 women) participated in the second study on a purely voluntary basis. Instructions, video materials, and procedures were identical to those employed in study one, except for differences related to the experimental conditions. The subjects were randomly and equally assigned to one of four conditions. After viewing the videotaped performances, they completed the same rating scale as had the subjects in the first study.

Experimental Conditions

Four experimental conditions were created by manipulating two independent variables: disability status (disabled vs. nondisabled) and performance standards (specified vs. unspecified). We manipulated disability status using the same cover letters as were used in study one. Performance standards were manipulated by providing half the subjects with a booklet illustrating common errors and correct performance for each task to be observed (e.g., sawing on the waste side of a line, sanding and staining with the grain of the wood). Subjects in the specified standards condition were instructed to read the booklet carefully and ask any questions they had before going on. The remaining subjects received no booklets and were simply told to use their judgment regarding the correctness of the performance they would view. Subjects from the four treatment conditions were tested during separate sessions lasting approximately 30 minutes.

In addition, as in study one, ratee proficiency was manipulated by having three ratees each perform at either a 75, 50, or 25 percent effectiveness level. Thus, the overall design was a 2 × 2 × 3 factorial design, with disability status and performance standards as between-subjects factors and proficiency level as a within-subjects factor.

Results

Table 2 presents the mean overall performance rating and the mean task ratings for each condition. We used a 2 × 2 × 3 repeated measures ANOVA with overall performance rating as the dependent variable to test the main hypothesis that clear performance standards would reduce the bias towards the disabled workers. The results indicated main effects for both disability status ($F_{1,116} = 5.94$, $p<.01$; $\eta^2 = .05$) and performance standards ($F_{1,116} = 46.84$, $p<.001$; $\eta^2 = .29$).

A significant interaction between status and standards qualified those effects ($F_{1,116} = 14.84$, $p<.001$; $\eta^2 = .11$). The overall performance means in Table 2 show that when the performance standards were unspecified, disabled workers were rated higher than nondisabled workers across all levels of proficiency. If we collapse the means across the three proficiency levels, disabled workers receive a mean rating of 3.81, versus 3.28 for nondisabled workers ($t_{58} = 3.53$, $p<.05$) when the standards were unspecified. On the other hand, when performance standards were specified, the difference virtually disappeared, with nondisabled workers rated slightly higher at all proficiency levels; collapsed across all proficiency levels, the means were 3.00 for nondisabled workers and 2.90 for disabled workers.

A 2 × 2 × 3 MANOVA using the specific task ratings as dependent variables provided additional evidence that subjects rated disabled and nondisabled workers differently ($F_{4,112} = 4.97$, $p<.01$) and that an interaction between status and standards ($F_{4,112} = 5.37$, $p<.01$) qualified the effect. Subsequent univariate analyses (ANOVAs) performed on each task rating indicated that disabled workers were rated significantly higher than nondisabled workers on sawing ($F_{1,115} = 4.03$, $p<.05$), sanding ($F_{1,115} = 4.73$, $p<.05$), fastening ($F_{1,115} = 18.52$, $p<.01$), and staining ($F_{1,115} = 6.45$, $p<.05$). Furthermore, those analyses revealed interaction effects between disability status and standards for performance ratings of sawing ($F_{1,115} = 3.06$, $p<.10$), sanding ($F_{1,115} = 12.06$, $p<.01$), fastening ($F_{1,115} = 16.65$, $p<.01$), and staining ($F_{1,115} = 3.96$, $p<.05$), which indicated that disabled workers were rated more favorably when raters did not receive specified performance standards.

Overall, the results of study two showed that disability status, a source of bias in ratings, was eliminated when we specified performance standards for the raters before their evaluation of the workers.

DISCUSSION

The results of the two studies reported here suggest that knowledge of workers' emotional disability may have a biasing effect on performance evaluations but that the bias seems to favor disabled workers. Thus, it appears that rather than treating workers who have recently overcome a disabling emotional condition as members of an outgroup, raters may feel a need to be fair, and even supportive, in their evaluations of those workers. More important, in study two, when raters had available clear performance stan-

TABLE 2
Mean Performance Ratings and Standard Deviations: Study Two

Disability Status[a]	Proficiency Level[c]	Overall Performance Rating[d]		Specific Task Ratings							
				Sawing		Sanding		Fastening		Staining	
		Means	s.d.	Means	s.d.	Means	s.d.	Means	s.d.	Means	s.d.
No disability											
Performance standards[b]											
Unspecified	25% effective	3.11	0.59	4.10	0.61	3.13	1.19	2.50	0.94	2.80	0.80
	50% effective	2.80	0.63	2.97	1.03	2.37	1.03	1.90	0.88	3.87	0.86
	75% effective	3.92	0.49	4.23	0.81	2.93	0.94	4.37	0.67	3.97	0.72
Specified	25% effective	2.40	0.69	4.97	0.90	2.03	0.93	1.83	0.65	2.07	0.91
	50% effective	2.90	0.76	3.43	1.16	2.90	1.24	1.67	0.66	3.70	0.98
	75% effective	3.78	0.67	3.77	1.40	2.40	1.13	4.57	0.68	4.27	0.78
Disability											
Performance standards[b]											
Unspecified	25% effective	3.68	0.62	4.67	0.55	3.57	0.81	3.33	1.03	3.53	0.89
	50% effective	3.62	0.66	3.73	1.01	3.60	1.13	3.47	1.04	4.13	0.73
	75% effective	4.10	0.57	4.23	0.97	3.47	0.97	4.63	0.56	4.40	0.67
Specified	25% effective	2.37	0.53	4.62	0.62	1.93	0.80	1.79	0.56	2.34	0.86
	50% effective	2.78	0.85	3.55	1.21	2.55	0.98	1.82	0.85	3.51	1.09
	75% effective	3.60	0.60	3.59	1.23	2.34	1.11	4.52	0.69	4.34	0.81

[a] For the disability status effect for each dependent variable, all Fs > 4.0, p's < .05. For the status × standards effect for each dependent variable, all Fs > 3.5, p's < .05, except for the sawing task (F = 3.0, p < .10). For the status × standard × proficiency effect, all Fs < 2.1.

[b] Each performance standards condition included 30 subjects.

[c] 25% effective = The sawing task was performed correctly, the other three incorrectly.
50% effective = The sawing and staining tasks were performed correctly, the other two incorrectly.
75% effective = The sawing, fastening, and staining tasks were performed correctly, the sanding task incorrectly.

[d] The results are based on a single rating of overall performance.

dards on which to base their judgments, the bias favoring disabled workers virtually disappeared.

Of course, caution must be exercised in generalizing the results of the present research to real organizations. In addition to the limitations inherent in laboratory studies, a particular concern prevails here. Unlike supervisors in actual organizations, the college students had few costs associated with their appraisals and subsequent decisions, which may have elicited an unusual consideration of the ratees' disability. Future research should address this question, either by designing lab studies that include more of the contextual variables found in work organizations, such as face-to-face interactions between raters and ratees (Dipboye, 1985), or through replication in a field study.

The present results have important implications for both future research and employment practices. Future research should investigate differences in the disabilities associated with workers to see if raters react differently to such different disabilities as, for instance, alcoholism, blindness, and heart disease. For example, Krefting and Brief (1976) found little effect for disability status when the disabled workers were in wheelchairs. On a related note, Berven and Driscoll (1981) pointed out that, even for persons suffering from emotional illness, public reaction will not be uniform, since the label is associated with many conditions that vary in severity as well as in social acceptability. In addition, future research needs to investigate the interactive effects of type of task or job and disability status. We might expect the significance of disability effects to vary as a function of the job in question. In the present research, raters may have given high ratings to the disabled workers because they viewed the tasks as appropriate for emotionally disabled individuals.

From a practical or a legal standpoint, the control of any disability bias contributes to human resource goals of treating all workers the same. Two suggestions emerge as ways of controlling such bias. The first is to render a disability a nonsalient characteristic. For example, in the present research, we made some effort to make it clear to the raters that the ratees had suffered a disabling emotional condition, making the disability a salient feature. In practice, it would be possible to downplay a worker's emotional disability and thus make it nonsalient. Of course, it might be more difficult and take special consideration to downplay physical disabilities.

The second suggestion involves making job-relevant information salient. Terborg (1977) argued that ambiguity increases reliance on stereotypes. Other researchers have noted that providing job-relevant information (Renwick & Tosi, 1978) and allowing direct observation of work behavior (Bigoness, 1976) reduces reliance on stereotypes. As this research demonstrated, giving raters specific task-relevant information in the form of clear performance standards on which to base their ratings can eliminate disability bias.

In conclusion, the present study demonstrated that perceptions of a ratee's disability may affect employment decisions. There appears to be a certain emotional ambivalence toward emotionally disabled workers that increases the likelihood they will be rated favorably. Fortunately, we showed that such bias can be controlled by specifying performance standards to raters. Finally, emotionally disabled individuals represent a significant portion of our population, and thus the understanding and effective elimination of any bias toward them is essential for their successful and productive incorporation into the workforce.

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PERSONAL CONTROL AS A MEDIATOR BETWEEN PERCEPTIONS OF SUPERVISORY BEHAVIORS AND EMPLOYEE REACTIONS

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The recent interest in empowerment (Kanter, 1983), entrepreneurship and "intrapreneurship" (Pinchot, 1985), and transformational leadership (Bennis & Nanus, 1985) reflects an increasing realization by managers as well as by academicians that the creativity and self-motivation of employees enhances their effectiveness in organizations. In order for managers to implement programs that encourage those desirable characteristics, a basic question must be answered: what underlying factors, both internal to employees and within their work environment, tend to facilitate or impede their tendency to initiate action? Previous research has defined personal control as "an individual's beliefs, at a given point in time, in his or her ability to effect a change, in a desired direction" (Greenberger & Strasser, 1986: 165).[1] Organizational members are likely to initiate actions to the extent to which they perceive themselves as possessing such personal control.

The importance of personal control has been well established in the psychological literature (Baum & Singer, 1972; Langer, 1983; Perlmuter & Monty, 1979). Previous research has indicated that most individuals want control; for example, White asserted that people have an "innate need to manipulate the environment" (1959: 297). Researchers have also found that loss of control has a variety of undesirable consequences (Allen & Greenberger, 1980; Averill, 1972; Glass & Singer, 1972; Seligman, 1975). Thus, Fiske and Taylor stated that "psychological control is a conceptual cornerstone of much psychological thinking" (1984: 136).

Personal control differs in a number of important ways from the more familiar variables of locus of control and power. Locus of control (Rotter, 1966) is conceptualized to be a fairly stable propensity for people to locate causality for outcomes either within themselves or within their external

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[1] This definition is consistent with the work of Alloy and Tabachnick (1984), who suggested that the detection of covariation—the perception of co-occurrence between action and outcome—is fundamental to perceptions of control.

environment. In contrast, the amount of personal control a person possesses can vary across time and situation. Although power (French & Raven, 1968; McClelland, 1961; Tedeschi, 1974) and influence (Mowday, 1978)—the capacity of a person to influence others—overlap the concept of personal control, they also differ from it. An individual's power can be evaluated by what target individuals say about a source's power;[2] power refers to some ability to exert an influence on other individuals. Personal control, in contrast, is a subjective state, based on beliefs, personality, observations, and biases, that can only be assessed through self-reports and concerns influence over situations as well as over individuals. Further, Langer (1983) pointed out that the need for power is much less constant across individuals and across their lives than is the need for control; events may alter control's magnitude, but the basic need for control is present in most people throughout their lives. Finally, low levels of personal control, not power, have been associated with such diverse negative outcomes as stress, depression, susceptibility to cancer, and even death (Averill, 1973; Baum & Singer, 1980; Seligman, 1975).

Research has suggested that a reduction of personal control will precipitate a reaction designed to restore personal control. Wortman and Brehm (1975) proposed a sequential model of responses to the loss of control: an individual first attempts to restore control directly; if repeated attempts to restore control result in failures, learned helplessness (Seligman, 1975) results. In an organizational setting, where systems are often designed expressly to limit employees' freedom of action (Greenberger & Strasser, 1986; Martinko & Gardner, 1982), organizational members may learn to avoid helplessness through activities unrelated to the source of the control loss (Greenberger & Strasser, 1986). For example, if a supervisor tells employees they will not be able to complete their projects, they may successfully seek a measure of control in some other area, such as by taking unauthorized leaves of absence.

This study assessed the construct of personal control in an organizational setting, using a model of personal control in organizations (Greenberger & Strasser, 1986) as a basis. The model includes two key elements that are critical to an understanding of personal control: control desired and control possessed. We expect perceptions of how things covary that result from supervisory behaviors to be reflected in these two measures of personal control. Control possessed refers to individuals' beliefs about the covariance between their actions and outcomes. Control desired is a measure of how much control individuals would like in their organization. There were two areas of interest in the present study: (1) whether contingent and noncontingent behaviors of supervisors influence subordinates' perceptions of control possessed and control desired and (2) whether the behaviors of supervisors, together with subordinates' perceptions of personal control possessed and desired, influence the subordinates' tendency to attempt to increase control after control is reduced. When confronted with a real loss of control, how likely are people to react behaviorally to increase control or, alternatively, to manifest symptoms of helplessness by indicating that they will do nothing? It seems likely that people will tend to react to a reduction in control when they expect that such a reaction will be successful; an expectation of success is likely to exist when people have a strong sense of personal control, acquired as a result of achieving desired outcomes, or a strong desire for personal control with a concomitant belief that personal control is attainable.

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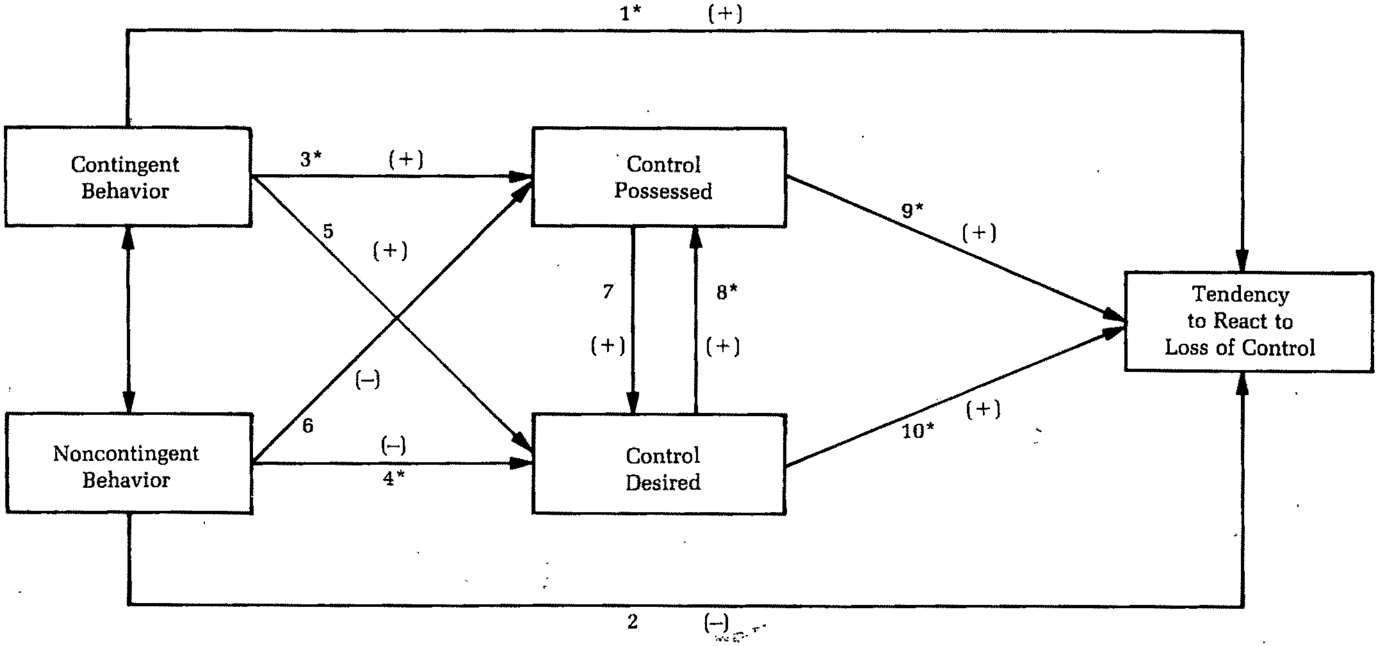
[2] Janice Beyer suggested this distinction.

A significant body of literature (Ivancevich, Szilagyi, & Wallace, 1977; Podsakoff, Todor, Grover, & Huber, 1984) has suggested that contingent and noncontingent rewards and punishments administered by supervisors affect employee behaviors. Contingent rewards and punishments are given by supervisors to subordinates when the latter perform well or poorly, respectively; alternatively, rewards and punishments subordinates perceive as not based on performance are characterized as noncontingent. Contingent and noncontingent supervisory behaviors provide subordinates with information about action-outcome covariation. If a supervisor is, for example, perceived as contingently punishing a particular action, a subordinate may come to expect contingent punishment in other situations. Thus, individuals may derive generalizations about their control in a variety of situations from the covariation information perceived from a single event.

The hypothesized model shown in Figure 1 is based in part on the rationale that contingent and noncontingent behaviors by a supervisor operate directly on a subordinate's tendency to react and operate indirectly through the subordinate's perceptions of personal control possessed and desired. We predicted the specific paths in the hypothesized model for the following reasons. The more frequently a supervisor administers contingent rewards or punishments, the more control subordinates will perceive themselves as possessing (path 3), since their beliefs about their own efficacy are reinforced. Similarly, the more frequently subordinates perceive supervisory behaviors as noncontingent, the lower the perceived control possessed (path 6). Furthermore, when subordinates see supervisors as exhibiting contingent behaviors, subordinates should see increases in control as achievable and therefore should desire higher levels of control (path 5). When, however, they perceive supervisors as behaving in noncontingent ways, subordinates will likely see obstacles to obtaining control and hence, over time, will lower their desires to a level consistent with what is realistically obtainable (path 4). With repeated occurrences, that reaction could lead to learned helplessness, which may be specific to a situation or may generalize to include a wide range of situations.

Control possessed and control desired were hypothesized to be reciprocally related. In general, the more control people believe they possess, the more likely they are to believe that control is obtainable and therefore, desirable (path 7). As individuals move from a feeling of control toward a state of helplessness—that is, as they learn over time that they cannot achieve what they desire—they may lower their desires for control. In turn, when control desired is low, people will be less likely to exert the effort necessary to achieve control and thus will possess less control (path 8). Finally, as

FIGURE 1
Hypothesized Model


1* (+)
Contingent Behavior
3* (+)
5 (+)
Control Possessed
9* (+)
7 (+)
8* (+)
Tendency to React to Loss of Control
(−) 6
(−) 4*
Noncontingent Behavior
Control Desired
10* (+)
2 (−)

*Paths maintained in model M_4.

indicated, we expected that both contingent and noncontingent behaviors by supervisors will have a direct effect on the tendency to react (paths 1 and 2) and an indirect effect through control possessed and desired (paths 9 and 10) because these supervisory behaviors influence subordinates' expectations regarding the likelihood that they will succeed in reactions designed to restore control. As indicated, individuals will tend to react to control loss when they believe that they will be successful—when they believe they will achieve desired outcomes—either because they already possess control or because they desire control.

In order to establish the validity of the proposed model, we collected data at two points in time from the same organization. We used time 1 data from the respondents who completed both questionnaires to test and trim the proposed model. We validated the final model with the time 2 data from those who completed both questionnaires and with time 1 or time 2 data from respondents who did not complete both questionnaires.

METHODS

Respondents and Procedures

Data were collected from nursing service employees employed at a large tertiary care hospital. Identical questionnaires were distributed to all (392) nursing service employees at two points five months apart. We asked respondents to place their names on the questionnaires. Confidentiality and privacy were guaranteed. For the time 1 administration, 253 individuals completed the questionnaire, of whom 94 percent were women. Their average age was 35 years, their average tenure in this hospital was slightly more than five years, and their average time in their present position was about four years. Twenty-two percent of the respondents had a high school education, 18 percent had some college, and the other 60 percent had a nursing degree. For the time 2 administration, 204 individuals responded to the questionnaire. The demographic data for the second group were nearly identical to those for the first, with five months added to age and to job and hospital tenure. Since there was little movement across units and very little turnover among supervisors, nearly all respondents kept the same supervisor across the five-month period. There were 149 nursing service employees who responded to both surveys, which represents an approximately 37 percent response rate for all nursing service employees. The analyses reported here were conducted on data provided by a subset of the 149 who responded completely to both questionnaires and by 99 respondents from the first and second administrations who responded completely to all study variables but did not respond both times. A large number of respondents could not be included because it was necessary to use a listwise deletion of missing data.

Measures

Control possessed and control desired were measured by two scales developed by Greenberger (1982: 7). The 11 items on one scale ask how much control an individual perceives himself or herself as having in a varie work-related areas; the 11 items on the second scale are identical bu how much control the individual would like to have. For example, res dents indicated perceived or desired control over such areas as a "varie tasks" or "when things will get done in your work unit." Responses made on a 5-point scale on which the higher the number, the greate perceived control possessed or desired. To form the scale score, we weighted and summed the items and divided by 11. In previous rese this scale has shown good psychometric properties (Greenberger, 1 Greenberger & Strasser, 1985). In this study, alpha for the control-posse scale was .88 at time 1 for the repeaters, .89 for the combined times 1 a nonrepeaters, and .88 at time 2 for the repeaters; for the control-desired s alphas were .89, .88, and .88 for the three data sets.

Contingent and noncontingent supervisory behaviors were measur summing the subscales developed and tested by Podsakoff and collea (1984). Responses were on a 7-point scale in which the higher the nur the greater the perceived contingent or noncontingent behaviors. The sure we called contingent behavior was formed by summing answers t items in Podsakoff's contingent reward and contingent punishment subsc The α = .85, .90, and .85 for the three data sets. Noncontingent behavio represents the sum of two subscales, noncontingent reward and noncontir punishment; α = .74, .74, and .76.

A measure of the tendency to react was developed for this study pretest, we asked 25 randomly selected nursing employees to list at three of the most important situations in which they felt they had control on the job" and to describe the way they behaved, felt, and th after losing control. We examined responses for commonality of situ and response. Two situations were cited most frequently and were moc by key informants: not being able to give input to a physician in the ment of patients and being short-handed on the job and therefore havi do the work of others. To broaden those situations to create four scenarios, we crossed the two situations with statements indicating tha respondent either had been singled out for this treatment or was one of to have had this problem. A list of possible common reactions followed scenario: (1) talk to your supervisor, (2) work harder, (3) "not try" at anymore,[3] (4) go above your supervisor to address the problem. Respon were asked to indicate the likelihood of their responding in each of ways on a 5-point scale where a high number indicated a greater likeli of so responding. Tendency to react to loss of control was an aggregate four responses for the scenarios (α = .74, .74, and .73). The higher the the more respondents indicated they would be likely to react behaviora a loss of control.

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[3] This item was reverse scored.

Analyses

Model development and estimation. Initial and modified path analytic models were estimated using LISREL VI (Jöreskog & Sörbom, 1984). The analytical approach employed was similar to Bohrnstedt and Felson's (1983) structural equation modeling approach. We evaluated the models' goodness of fit with a variety of measures: chi-square, the goodness-of-fit index, the root mean residual, and the normed fit index. We employed *t*-values, shrinkage in goodness of fit, and theoretical importance as criteria to decide which paths to delete, retain, or add. The null model and subsequent iterations of more parsimonious versions of it were compared using the techniques suggested by Bentler and Bonett (1980) and MacCallum (1986), although MacCallum stated that the "methodological literature on covariance structural modeling does not . . . define an optimal procedure for conducting specification searches" [the modification of the hypothesized model to make it more parsimonious] (1986: 109).[4]

Confirmatory validation. After obtaining a well-fit, theoretically justified, and parsimonious model, we attempted validation, employing the multisample option of LISREL. The option enabled us to analyze data from more than one group simultaneously and to constrain the structural effects to be equal across different groups with the structural effects from the initial group as a basis. The multisample analysis used data from the time 1 and time 2 respondents who did not complete both questionnaires and the time 2 data from those who completed both questionnaires. We employed the chi-squared goodness-of-fit measure, an overall measure of fit, and examined the shrinkage in goodness of fit between the initial model and the results of the multisample analysis.

RESULTS

Table 1 reports the means, standard deviations, and correlations for the time 1 data for the repeaters.

Table 2 reports step-by-step results of the analysis. Because the initial model was fully saturated, with all possible paths hypothesized, it was impossible to evaluate it in terms of goodness-of-fit measures (Pedhazur, 1982). We later deleted the weakest path, path 2, from the hypothesized model,

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[4] Recent work on specification searches suggests that experimenters should avoid basing the modification of their models solely on indices provided by LISREL, such as *t*-values, chi-square values, and modification indices. Researchers can delete paths that exist or keep nonexistent paths in a model modification. Farley and Reddy asserted that when errors occur "it is preferable to err in the direction of too rich specifications [too many paths] as long as the required conditions of parameter identifications are met" (1987: 87). Similarly, MacCallum suggested that experimenters "should use a restrictive search strategy, wherein no model modifications are made without rigorous substantive justification" (1986: 118). For the purposes of the present study, we decided to approach path retention restrictively and to keep paths of critical theoretical importance. Although Jöreskog and Sörbom stated that a *t*-value greater than 2.0 "normally is judged to be different from zero" (1984: III–13), they did not require the removal of a path solely on the basis of a small *t*-value. Thus, we retained paths in the present study when *t*-values were greater than 1.0.

TABLE 1
Means, Standard Deviations, and Correlations for Major Variables, Initial Respondents[a]

Variables	Means	s.d.	1	2	3	4
1. Contingent behavior	4.97	0.92				
2. Noncontingent behavior	2.50	1.03	−.25**			
3. Control possessed	2.88	0.75	.31**	−.19*		
4. Control desired	3.70	0.63	.13	−.17*	.54**	
5. Tendency to react to loss of control	3.53	0.46	.22**	−.13	.32**	.40**

[a] $N = 108$.
$^{*}p < .05$
$^{**}p < .01$

which created a testable, overidentified model (M_1) that fit the data adequately. That result suggested that M_1 fit the data significantly better than the null model. Although M_1 was satisfactory, we tried to improve its parsimony by deleting weak paths while maintaining as much of the model's theoretical integrity as possible. The adequacy of M_2 (with path 5 deleted) was comparable to that of M_1: the goodness-of-fit statistics were similar for both models. The next model, M_3 (with path 6 deleted), again fit the data as well as any of the earlier models. The goodness-of-fit statistics are comparable, and the coefficients are in the predicted directions. Finally, in M_4, we deleted the path from control possessed to control desired (path 7). M_4 is parsimonious, specifies most of the theoretical linkages, and again shows a good fit with the data. The probability level for the observed χ^2 was very high; the goodness-of-fit index was .996 (extremely close to 1.0), the root mean residual was .017 (substantially less than .05), and the normed fit index was .98. As indicated in Table 3, all resulting paths in this model possess t-values greater than 1.0 and are in the predicted direction. Finally, we tested one more model, M_5, deleting the next weakest, but theoretically important, path (path 9). The overall shrinkage from M_4 to M_5 was not significant. Although M_5 is more parsimonious than M_4, M_4 is preferable for theoretical reasons (see footnote 4).

Model Confirmation

The confirmatory validation supported the final model, M_4, which was based on time 1 data only. The parameters were constrained as equivalent across the data sets in the multisample analysis with the equivalence constraints based on the parameters derived in the development of M_4. The goodness-of-fit measure—which measures the overall fit of the model over the multiple groups—supported the model ($\chi^2 = 14.12$, $df = 16$, $p = .59$). The *t*-values of each path coefficient in the multisample analysis were all greater than 1.0. The amount of shrinkage in goodness of fit in the multisample option analysis as compared to the final model, M_4, was not significant ($\chi^2 = 12.76$, $df = 12$, $p > .10$), which suggests equivalence across samples. Finally, a marginally significant shrinkage in goodness of fit was found in the multi-

TABLE 2
Results of Goodness of Fit and Chi-Square Difference Tests for Null and Modified Models

Models	*df*	χ^2	p^a	χ^2/df^b	Normed Fit Index[c]	Goodness-of-Fit Index[d]	Square Residual[e]
M_0	10	80.74	.00	8.74		.74	.127
Initial model[f]							
M_1—path 2 deleted	1	.06	.81	.06	.99	.99	.002
M_2—path 5 deleted	2	.56	.76	.28	.99	.99	.011
M_3—path 6 deleted	3	1.12	.77	.37	.99	.99	.017
M_4—path 7 deleted	4	1.36	.85	.34	.98	.99	.019
M_5—path 9 deleted	5	2.27	.81	.45	.99	.99	.020

[a] $p < .05$ is significant. Models with a small χ^2 value and nonsignificant p level are regarded as having a good fit.

[b] A value lower than 3.0 indicates a good fit.

[c] Bentler and Bonnett's (1980) normed fit index; values larger than .9 indicate a good fit.

[d] The goodness-of-fit index is the relative variance explained by a model.

[e] Jöreskog and Sörbom's (1984) root mean square residual; valves lower than .05 indicate a good fit.

[f] The initial model was not testable.

TABLE 3
Path Coefficients and *t*-Values for Variables in Models M_4 and M_5[a]

	M_4		M_5	
Paths	Coefficients	*t*	Coefficients	*t*
1	.08	1.7	.09	2.1
3	.20	3.1	.20	3.1
4	−.10	−1.7	−.10	−1.7
8	.62	11.0	.61	6.3
9[b]	.06	1.0		
10	.24	3.1	.28	4.2

[a] Models M_4 and M_5 were the two final models tested.

[b] Path 9 was deleted in M_5.

sample analysis of M_5 as compared to the multisample analysis of M_4 ($\chi^2 = 3.44$, $df = 1$, $p < .06$), which suggests that M_4 is more generalizable than M_5. Although M_5 might have been more parsimonious, for both theoretical and empirical reasons the selection of M_4 as the final model appeared more plausible.

DISCUSSION

The results of the analyses provide support for our limited model of personal control in organizations. Both the model (M_4) based on the first wave of questionnaire data and the validation of that model, based on the repeat respondents from the second wave of questionnaire data and the respondents who only completed one questionnaire, had good overall fits to the data. The results of this study go beyond those of Podsakoff and colleagues (1984) by indicating some ways in which perceptions of supervisory behaviors affect subordinates beyond satisfaction and performance. Perceptions of supervisors' behaviors increase subordinates' beliefs about control and the desire for control directly and indirectly, and influence their tendency to react to loss of control. Increase in the tendency to react is important if such behaviors as innovation, creativity, and self-management are to be encouraged in a work environment. People may not always be successful on their first attempt to implement a new idea, as they may encounter organizational barriers to the accomplishment of outcomes that may be beneficial to the organization. Employee willingness to react to control loss may make the difference between a thriving organization and a stagnant one.

Three limitations should be noted. First, although the proposed model was supported, we did not attempt an exhaustive test of all alternative configurations. Second, the cross-sectional nature of the study limits the ability to identify causal specifications; because of the considerable time that elapsed between administrations of the questionnaires, we chose not to analyze the data longitudinally. We believe that a meaningful longitudinal analysis could be performed only if the time lag between administrations was no greater than one month. Third, the weakness of some of the paths, most notably path 9, may be a function of a lack of specificity of the dependent variable. The dependent variable aggregates different responses that respondents would or would not choose to evoke in the presence of different antecedents. Therefore, the variable might not maximize ability to identify explained variance. Future research needs to assess the relationships among specific antecedents and a more extensive list of nonaggregated responses.

Clearly, supervisors play a significant role in affecting their subordinate's perceptions and behaviors relating to personal control. Managers can increase employees' sense of personal control and tendencies to react to control loss through contingent rewards and punishments. Alternatively, through noncontingent supervisory behaviors, they can also make their subordinates feel helpless at work and thus curtail initiative. Interestingly, the present results provide support for Argyris's suggestions that rewards and punishments can "enhance the employee's own feelings of competence" and that those feelings "may be a basic need of man" (1964: 255), increasing self-confidence and internal commitment. Under conditions of "internal commitment and psychological success, the motivation for realistic increases in productivity and achievement is almost limitless" (Argyris, 1964: 256). Of course, we have only studied two related antecedents of personal control; there are many other ways in which managers influence perceptions of control.

The results raise a complex research question that merits further study. Although not tested here, the explanation for our finding both a direct and indirect linkage between perceptions of supervisory behaviors and the tendency to react may be found in the salience (Taylor & Fiske, 1978) of contingent supervisory behaviors. The adjustments people "make to their control perceptions are based only on those particular events to which they *attend*" (Greenberger & Strasser, 1986: 169). For example, when uncertainty, ambiguity, or unpredictability characterize an antecedent event, supervisory behaviors are salient; an unexpected, though justifiable, low performance evaluation is an example. Individuals cognitively assess the degree to which such an event indicates the amount of control they have and follow an indirect path. In contrast, when the perceived supervisory behaviors are not salient, such as in the case of a supervisor who administers contingent rewards in a consistent, predictable, and expected manner, an employee may cognitively bypass, or speed through, the evaluation of control. Having had experience with these supervisory behaviors in the past, the employee may rely on a learned reaction schema in such a situation (Taylor & Fiske, 1978). Support for this salience argument may exist in the finding that supervisory noncontingent behaviors only indirectly influence the tendency to react. Since the noncontingent behaviors displayed by supervisors are by definition random and unpredictable, we would have expected most employees to find them to be salient. The data indicate that it appears necessary for employees to evaluate the amount of control they desire and possess *before* reacting when supervisory behavior is noncontingent. Although it would be very difficult to examine in a field setting, the issue of salience needs to be examined in future research.

Other questions for future research remain. First, a direct measure of learned helplessness needs to be developed and tested. It is unclear whether those organizational members who manifest a low tendency to respond to certain behavioral items are really helpless or are simply unable to respond to this particular set of behavioral responses. Second, in light of the suggestion made by Greenberger and Strasser (1986) that people have a hierarchy of responses to low levels of control, future empirical studies need to manipulate the available responses to see whether a hierarchy does in fact exist. Third, other antecedents and consequences of personal control exist and need to be examined; the effects, for instance, of participation in decision making may be a direct function of perceptions of control desired and control possessed. Finally, longitudinal studies with shorter time lags in different organizational settings will increase the generalizability both of our findings and of the response set to loss of control.

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INSTITUTIONAL OWNERSHIP AND CORPORATE R&D IN THE COMPUTER INDUSTRY

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Recently, the increasing level of institutional ownership of publicly held firms has led to concerns about the possible effects of such ownership on R&D spending and other long-term investment. Academic observers and business leaders alike have argued that such institutional owners as pension funds, mutual funds, endowments, foundations, and insurance companies have a myopic viewpoint when making investment decisions. Much of the increase in institutional ownership has accompanied the growth of pension

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fund assets following passage of the Employee Retirement Income Security Act in 1974. Whereas pension funds controlled only 6 percent of corporate equity in 1965, they owned 25 percent in 1987, and all institutions together held about 30 percent. Two authors have predicted that by the year 2000, pension funds alone should hold almost half of all equity (Nussbaum & Dobrzynski, 1987). An increase in the pace and volume of stock trading has accompanied the growth in institutional ownership; in 1985, 54 percent of all New York Exchange shares were traded, up from 16 percent in 1965 (Choate & Linger, 1986).

The view that institutional owners invest for the short term has been widely expressed (Drucker, 1986; Mitroff, 1987; Scherer, 1984). The reason is that institutional money managers, who are reviewed and rewarded on the basis of quarterly, or at most, annual performance measures, cannot afford to take the long view in their investment decisions. Even those managers who are willing to risk their quarterly performance by holding a promising stock for the long run are compelled by their fiduciary responsibilities to sell on even a temporary price elevation, such as that associated with takeover activity. Managers of many corporate pension funds are under particularly strong pressure from company management, since the company's contribution to the pension fund goes down when the fund's asset value increases (Drucker, 1986; Herman, 1981).

Many business leaders report the adverse influences of high levels of institutional ownership on their firms. Andrew Sigler, chief executive of the Champion International Corporation, described an "intense pressure for current earnings" that discouraged long-term investments, and George Keller, chairman of the Chevron Corporation, charged that institutional money managers are "traders, not investors" in search of short-term gains and without regard for the consequences to a company (Dobrzynski, Shiller, Miles, Norman, & King, 1986: 92). The consequences of heavy institutional selling can be severe. Robert Miller, vice chairman of the Chrysler Corporation, complained that concentrated ownership of Chrysler equity by institutions—in 1987, half of Chrysler stock was owned by 30 institutions—exposed the stock to potentially drastic price declines if money managers disapproved of Chrysler's investment decisions. This pressure, he said, works against the kind of long-term planning that is consistent with growth and competitiveness (White, 1987).

The evidence for a negative relationship between institutional ownership and long-term investment is, as the above citations indicate, largely anecdotal. Existing empirical work, however, contradicts that thesis. Jarrell and Lehn (1985) studied the relationship between institutional ownership and R&D spending in 324 companies for the period 1980–83. Using those pooled data and ordinary least squares (OLS) regression equations with dummy variables for the 19 industries in their sample, they found a positive and statistically significant relationship between the level of institutional ownership and the R&D-to-sales ratio. This study extended the work of Jarrell and Lehn, using the same methodology but focusing in more detail on a single industry—computer manufacturing. The analysis was intended to determine what, if any, relationship exists between institutional ownership and R&D spending in that industry.

METHODS

The present analysis went beyond the previous empirical work of Jarrell and Lehn, which used only four years of data and controlled only for industry type. This study was based on ten years of data and controlled for market share, profit, exogenous secular trend,[1] and level of interest rates. Further, I used two measures of R&D intensity: constant-dollar R&D expenditures per employee and R&D as a proportion of sales. The study focused on one industry in order to facilitate the close scrutiny needed to isolate the institutional ownership effect in a study of limited scope.

Data

Data for institutional ownership were taken from *Standard and Poor's Securities Owner's Stock Guide*. The guides are published monthly and give total shares of common stock outstanding and total shares held by institutions for each company. I converted the data to annual observations by averaging the first and last observation of each year for every firm and converting this figure to a percentage of all common shares outstanding for the firm. The yield to maturity on series AAA corporate bonds, as given in *Standard and Poor's Statistical Service: Security Price Index Record*, represented interest rates for the period 1976–83. For 1984 and 1985, the AAA series was discontinued, so AA yields were used. All other data were taken or derived from Standard and Poor's COMPUSTAT services published in annual *Business Week* "R&D Scoreboard" reports. Other data included (1) company identity; (2) year of observation; (3) company sales, including all sales and other operating revenues; (4) profit, defined as net income (as a percentage of sales) before extraordinary items or discontinued operations, and before R&D expenses; (5) R&D expenditures, defined as expenditures on company-sponsored research and development for the year as reported to the Securities and Exchange Commission on form 10-K and excluding any expenditures for R&D performed under contract to others, such as U.S. government agencies; and (6) R&D expenditures per employee, which were simply R&D expenditures (in constant 1967 dollars) as defined in item 5, divided by the reported number of company employees. This study's data base included observations from 22 computer-manufacturing companies for the period from 1976 to 1985. Some of the companies were not in existence for the entire period, and some points were lost due to missing data. In all, the primary data base included 151 observations. After I lagged each independent variable by one year, a data base of 112 observations resulted.

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[1] This is a long-term trend or tendency that is not specifically explained by any known causal variables.

Market share observations (company sales as a percentage of industry composite sales) and R&D as a proportion of sales were also derived from COMPUSTAT data. I converted R&D expenditures per employee to constant 1967 dollars using the Consumer Price Index as given in the *Economic Report of the President.*

Expected Relationships

A priori, I expected market share, profit, and secular trend to show a positive relationship with R&D spending. The positive expectation for market share is based on the Schumpeterian hypothesis that firms with high market power and the corresponding ability to appropriate the benefits of innovative investments will spend more on R&D than will other firms. I expected a positive relationship between profit and R&D for obvious reasons. The secular trend variable, which reflects the general tendency of the level of R&D spending across all firms, was expected to account for whatever unspecified growth tendencies remained in the data after other variables had been included. I expected it to enter with a positive sign, since there was a strong and obvious long-term growth trend in the data. The interest rate variable was expected to enter with a negative sign, since high interest rates more heavily discount long-term returns due to innovation than do low interest rates. The direction of the institutional ownership effect was not clear a priori, since existing empirical work and anecdotal evidence led to conflicting expectations.

Basic Statistics

Table 1 gives basic statistics for the data set. R&D spending increased substantially over the period of observation. R&D spending per employee grew from an industry mean of $1,213.40 per employee in 1976 to $3,006.20 in 1985, a 10.6 percent compounded real rate of increase. That growth rate greatly exceeds the growth rate for all industries, which was about 6 percent in real terms from 1975 to 1985 (National Science Foundation, 1987). Average R&D spending as a proportion of sales began the period at .057 and ended in 1985 and .097. Aggregate institutional ownership also showed a strong upward trend, growing from 15.9 percent of the industry in 1976 to 55.1 percent in 1985. Those data can be compared to the averaged data for all industries cited by Jarrell and Lehn (1985), which showed that institutions owned 30 percent of all equity in 1980. For computer manufacturers, the 1980 figure was just under 35 percent. In 1983 the average for all industries was 38 percent, compared to 45 percent for computer manufacturers. The institutional ownership trend in this industry parallels that of other industries, but the absolute level is ahead of the average. Each of these aggregate measures masks substantial variability among firms. Notice the maximum value, minimum value, standard deviation, and mean value given in Table 1 for each of these measures for 1976, 1985, and for all the years studied combined. In 1976 R&D spending per employee varied from $684.50 to $2,032.80, and institutional ownership ranged from 1.1 percent to 30.7 percent. In 1985

R&D spending per employee varied from $1,463.10 to $6,056.80, and institutional ownership from 19.8 to 81.0 percent. This natural variability among firms makes it hazardous to draw inferences about the relationships between the variables on an aggregate basis. The next stage of analysis, which used disaggregated data, performed that task.

Analysis

The relationship between the two dependent variables and various combinations of independent variables was explored using ordinary least squares (OLS) multiple regression. All specifications were linear in the original data. When I combined time-series data from separate firms into a single data set, a pooled cross-sectional time-series model resulted. In that model, constant effects for the explanatory variables both over time and across firms were assumed. The presence of a secular trend term, however, allowed for linear growth or decline in the intercept value.

RESULTS

The analysis was performed once for contemporaneous values and once for R&D expenditures measured one year after the independent variables. The analysis was also run once with IBM included and once with IBM removed from the data base. I took that precaution because of the extreme size difference between IBM and all other firms; IBM's average market share for the period of interest was 49.4 percent, compared to 2.9 percent for all other firms. The large difference could raise doubt about the assumption of constant parameters across firms. Table 2 gives bivariate correlations, and Table 3 gives the OLS results. The first equation (Table 3, model 1a) shows the estimated regression relation between the dependent variable, R&D spending per employee in constant 1967 dollars, and five independent variables. Regardless of whether the lagged or contemporaneous results are used, the first equation shows statistically significant coefficients ($p < .05$; two-tailed test) for the first four variables, with only interest rate insignificant. The second equation drops out the least significant variable, interest rate, and the third equation drops out market share, the least significant variable in the second equation. The second set of three equations (models 4a, 5a, and 6a) follows the same pattern, with R&D as a ratio to sales as the dependent variable. The results are consistent, regardless of the choice of dependent variable and regardless of whether the lagged or contemporaneous model is used; the first four variables are significantly related to the R&D variable and the signs are consistent. There is also stability as independent variables are dropped, with signs remaining the same and only modest changes in the estimated coefficients for a given specification. On the basis of these results, models 2a and 5a appear to be the preferred equations. Each of those four-variable models includes only significant ($p < .05$ level) independent variables and loses nothing in explanatory power, compared to the five-variable model.

TABLE 1
Basic Statistics

	R&D Spending per Employee[a]	R&D Spending as Ratio to Sales	Institutional Ownership	Profit as Ratio to Sales	Market Share	Interest Rate
1976						
Maximum value	2,032.80	.107	30.7%	.224	44.3%	8.36%
Minimum value	684.50	.027	1.1	.040	0.2	8.36
Standard deviation	400.60	.021	9.3	.059	12.1	
Mean	1,213.40	.057	15.9	.120	7.1	8.36
1985						
Maximum value	6,056.80	.156	81.0	.328	51.0	11.40
Minimum value	1,463.10	.038	19.8	–.068	0.1	11.40
Standard deviation	1,339.30	.031	17.4	.085	11.9	
Mean	3,006.20	.097	55.1	.147	6.0	11.40
1976–85						
Maximum value	7,249.40	.201	81.0	.362	53.7	13.90
Minimum value	469.30	.018	0.0	–.189	0.0	8.12
Standard deviation	1,339.00	.035	22.3	.086	11.4	1.95
Mean	2,162.70	.081	37.5	.136	5.6	11.40

[a] R&D spending per employee is in constant 1967 dollars.

TABLE 2
Intercorrelations[a]

Variables	1	2	3	4	5	6	7
All firms							
1. R&D spending per employee		.81	.05	.38	.53	–.12	.25
2. R&D spending as a ratio to sales	.79		.22	.41	.50	–.23	.28
3. Institutional ownership	.07	.22		.48	.41	.12	.30
4. Year	.37	.38	.53		.01	–.09	.64
5. Profit as ratio to sales	.51	.47	.34	.00		.18	.04
6. Market share	–.11	–.22	.14	–.06	.17		–.11
7. Interest rate	.26	.31	.38	.72	.05	–.07	
IBM excluded							
1. R&D spending per employee		.82	.05	.39	.54	–.43	.26
2. R&D spending as a ratio to sales	.80		.23	.43	.54	–.38	.29
3. Institutional ownership	.07	.23		.46	.42	.45	.29
4. Year	.37	.39	.52		.02	–.17	.64
5. Profit as ratio to sales	.53	.51	.35	.01		–.03	.06
6. Market share	–.38	–.33	.47	–.11	–.05		–.18
7. Interest rate	.27	.32	.36	.72	.07	–.12	

[a] Correlations above the diagonals are for lagged values of institutional ownership, profit, market share, and interest rate. Correlations below the diagonals are for contemporaneous values.

The model 2a coefficients for the lagged specification imply that, ceteris paribus, a one-percentage-point increase in institutional ownership is associated with about a $33 decline in R&D spending per employee. Similarly, a secular increase of about $308 per year in R&D spending per employee appears likely. A one-percentage-point increase in net profits (before R&D expenses) leads to about $112 in additional R&D spending per employee, but an increase of one percentage point in market share yields a decline of about $16. The explanatory power of the first six equations in Table 2 is reasonable for cross-sectional data; R^2 values for the lagged models range from .47 to .64, the first four variables are significant in each specification, and there are no sign reversals.

The second sequence of equations (models 1b through 6b) repeats the first six, except that IBM was excluded for this analysis. The results differ in only two ways: (1) market share is insignificant in the first two equations when R&D spending per employee is the dependent variable and (2) institutional ownership is insignificant in the first two equations when R&D as a proportion of sales is the dependent variable. A higher level of correlation between institutional ownership and market share when IBM is dropped from the data set explains both those occurrences. With IBM included, the estimated correlation coefficient between the two variables for the lagged data is .12; the value climbs to .45 when IBM is dropped. (See the intercorrelations in Table 3.) In each of the three-variable models where this collinearity is removed, the results closely parallel the with-IBM results, both in terms of significance levels and with respect to the estimated values of the coefficients.

DISCUSSION

The data suggest that, among computer manufacturers, R&D spending was, ceteris paribus, higher in firms where institutional ownership was lower, profit higher, and market share lower and that, beyond those effects, R&D spending grew on a secular basis. These findings are strongest with regard to the secular effect, the profit effect, and the market share effect where there is unanimity in the results regardless of the specifications of the model. The results are slightly weaker with respect to institutional ownership, which is insignificant in two models when IBM is omitted from the data base.

These results differ from those of the Jarrell and Lehn study, which used a similar model, probably because their analysis included only institutional ownership as an independent variable, aside from an industry indicator term. That specification may have confounded the effects of the secular time trend and institutional ownership.

The results of my study on the computer industry indicate that when R&D spending per employee was regressed against institutional ownership alone, there was no significant relationship. When R&D as a proportion of sales was regressed against institutional ownership alone, a significant positive relationship resulted. This significant positive relationship, however, became insignificant as soon as a second variable, secular time trend, was entered, lending further support to the possibility of confounding the time trend and the institutional ownership effects. Further, aggregate data for all industries showed that both the R&D-to-sales ratio and institutional ownership have increased steadily in recent years. Jarrell and Lehn cited an increase in institutional ownership from 30 percent of common equity in 1980 to 38 percent in 1983. Aggregate data from the National Science Foundation (1984) show a secular increase in company R&D funds as a percentage of net sales, from 2.1 percent in 1980 to 2.2 percent in 1981 and 2.6 percent in 1982 and 1983. With each of these series moving regularly upward over the same period, it would be easy to infer a causal relationship where perhaps none exists.

CONCLUSIONS

The results of this study suggest that R&D intensity in the computer-manufacturing industry increased secularly during the period 1976 to 1985, and that, with secular effect, profit, and market share controlled, there has been a significant negative relationship between institutional ownership and R&D spending. This result contradicts earlier empirical work that found a positive relationship between the two variables but agrees with the anecdotal

TABLE 3
Results and Estimated Regression Coefficients[a,b]

Models/Dependent Variables	Independent Variables						
	Institutional Ownership	Year	Profit	Market Share	Interest Rate	R^2	F
All firms[c]							
1a. R&D spending	–33.48***	326.5***	11,219***	–16.13*	–45.12	.64	37.4
per employee	–28.71***	330.9***	10,894***	–14.12*	–68.67	.57	38.0
2a. R&D spending	–33.40***	307.9***	11,170***	–15.74*		.64	46.7
per employee	–28.57***	295.5***	10,798***	–13.78*		.57	46.9
3a. R&D spending	–34.63***	318.6***	10,923***			.62	58.1
per employee	–29.92***	304.9***	10,606***			.55	59.8
4a. R&D spending	–4.05E-4**	6.91E-3***	.25***	–8.17E-4***	7.74E-4	.54	24.5
as ratio to sales	–2.62E-4*	5.53E-3***	.23***	–7.86E-4***	1.17E-4	.45	24.0
5a. R&D spending	–4.04E-4**	6.59E-3***	.25***	–8.10E-4***		.54	30.8
as ratio to sales	–2.62E-4*	5.59E-3***	.23***	–7.87E-4***		.45	30.2
6a. R&D spending	–4.67E-4**	7.14E-3***	.24***			.47	31.4
as a ratio to sales	–3.39E-4**	6.13E-3***	.22***			.39	31.1
All firms except IBM[d]							
1b. R&D spending	–30.30***	320.6***	10,852***	–42.51	–45.68	.65	36.0
per employee	–25.72***	323.8***	10,563***	–40.48	–72.44	.57	36.2
2b. R&D spending	–30.42***	303.1***	10,824***	–40.17		.64	45.1
per employee	–25.58***	286.7***	10,456***	–39.40		.57	44.6
3b. R&D spending	–35.24***	328.9***	11,331***			.64	59.6
per employee	–30.19***	310.8***	10,929***			.56	59.0

TABLE 3 (continued)

Models/Dependent Variables	Independent Variables: Institutional Ownership	Year	Profit	Market Share	Interest Rate	R^2	F
4b. R&D spending	−1.31E-4	5.88E-3***	.22***	−3.09E-3**	−9.21E-4	.56	24.9
as ratio to sales	−3.77E-5	4.24E-3**	.19***	−3.31E-3**	1.13E-4	.47	24.2
5b. R&D spending	−1.33E-4	5.53E-3***	.22***	−3.04E-3**		.56	31.3
as ratio to sales	−3.74E-5	4.30E-3**	.19***	−3.31E-3**		.47	30.5
6b. R&D spending	−4.97E-4**	7.48E-3***	.26***			.52	36.7
as ratio to sales	−3.50E-4**	6.33E-3***	.23***			.43	34.8

[a] E-4 designates 10^{-4}, E-3 designates 10^{-3}, etc.

[b] The first line of estimates for each model is for lagged institutional ownership, profit, market share, and interest rate. The second line is for contemporaneous values.

[c] $N = 112$ for lagged models, $N = 151$ for contemporaneous models.

[d] $N = 105$ for lagged models, $N = 142$ for contemporaneous models.

*$p < .05$, two-tailed test.

**$p < .01$, two-tailed test.

***$p < .001$, two-tailed test.

evidence suggesting that high levels of institutional ownership may suppress R&D spending.

The implications of these findings for the practice of management are potentially quite profound. Institutional ownership of publicly held firms is high and is likely to continue growing. From this study, it appears that level of institutional ownership may influence management decision making—in particular, that high levels of institutional ownership may inhibit long-term investments such as R&D spending. Inhibition of R&D investment may, in turn, lead to decay in the international competitiveness of U.S. firms. This shift in the ownership pattern of firms, together with its effects on management decision making and competitiveness, should be the subject of close study to determine whether policy prescriptions are in order.

The results of this analysis point the way toward a more definitive study of the linkage between R&D investment and institutional ownership. This important future work will require examination of that relationship in a cross-section of industries over a long time period, with the same effects controlled as in the present study. The results of such research should provide a clearer view of the relationship between institutional ownership and R&D spending and illuminate more clearly the policy issues of management decision making and control.

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INTERLOCKING DIRECTORATES AS AN INTERORGANIZATIONAL STRATEGY: A TEST OF CRITICAL ASSUMPTIONS

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This study identified some critical assumptions underlying the view that interlocking directorates are vehicles for interorganizational coordination or control and examined them in a two-stage empirical analysis of interlocks among competing firms. The study (1) reexamined—on a disaggregated, firm-by-firm basis—data previously used to identify interlocks between firms in the same industry and (2) constructed a baseline for assessing the significance of the incidence of interlocking among competitors.

CRITICAL ASSUMPTIONS OF RESEARCH ON INTERLOCKING DIRECTORATES

The prevailing view of interlocking directorates sees them as vehicles for interorganizational coordination or control. For example, Pfeffer and Salancik (1978) and Aldrich (1979) viewed interlocks as dyadic interorganizational strategies that, like mergers and joint ventures, are "used to manage the organization's relationship with the environment," for example, by reducing "competitive uncertainty" (Pfeffer and Salancik, 1987: 165). However, it is not obvious that board members with two or more directorships actually function as interorganizational linkages; in joining another board, a board member may simply be acting on personal motives (Zajac, 1988). Unfortunately, most research on interlocks has assumed that dual board membership serves a linking function and has focused instead on establishing the frequency of interlocks.

Virtually all research on interlocking directorates has relied on the counting and categorization of such linkages. For example, counting the number, or the frequency, of interlocks between competing firms (a categorization) has

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been the basis for testing the resource-dependence and interorganizational perspective. Pfeffer and Salancik (1978), Pennings (1980), and others who view interlocks as reducing competitive uncertainty through the sharing of information regarding industry conditions (e.g., pricing, product differentiation, and so forth) have taken such an approach to interlocks among competitors. Investigators who take the interorganizational perspective predict that high strategic interdependence (Pennings, 1981) among firms leads to a high incidence of interlocking behavior.

Pennings (1980, 1981) distinguished three types of interdependence: (1) horizontal—between competing organizations; (2) vertical—between organizations located in adjacent stages of production; and (3) symbiotic—between complementary organizations. Symbiotic interdependence, Pennings stated, "has relatively little strategic relevance" (1980: 11). Vertical interdependence is difficult to study because assessing vertical interlocks involves a high degree of subjectivity. This study therefore focused on horizontal interdependence, both to avoid any confusion and to maintain the historical emphasis of previous research on interlocks among competitors (Brandeis, 1914).

The findings of empirical studies in the literature appear to support the conceptual expectation that there will be many interlocks among firms within an industry. Dooley, for example, after examining interlocking among the *Fortune* 250 in 1965, stated that "nearly one in every eight interlocks involves companies which are competitors" (1969: 320). Pennings, having made an exhaustive study of interlocks among the *Fortune* 500 for 1969, wrote that firms in the chemical, steel, and transportation equipment industries "would appear to be the most blatant violators of Section 8 of the Clayton Act" (1980: 87). The Clayton Act prohibits interlocks among competing firms.

However, the substantive significance of simple reports of aggregate interlocking frequency can be ambiguous. The statement from Dooley (1969) just cited is an example: upon reading that nearly one in every eight interlocks is between competitors, a reader must interpret the significance of that number without the benefit of any other information. No comparative data are offered. In fact, in another study (Zajac, 1988) I showed how two researchers used the exact same statistic regarding the frequency of competitor interlocks to arrive at opposite conclusions as to whether firms were managing competitive uncertainty through use of interlocks.

Therefore, it appears that empirical assessments of interlocks among related firms must deal with at least two important issues. The first issue is whether a disaggregated, firm-by-firm analysis of the composition of interlocks would reveal more about the nature of collusion among competitors than the aggregated frequency data commonly used. In other words, exactly who is linked with whom? A second issue is the need to provide a comparison group when assessing the frequency of interlocks. The frequency of the occurrence of interlocking directorates among a category of competitively interdependent firms should be compared not with an expected value of zero but with the number of interlocking directorates found in an equally large set of randomly selected firms. Most research on interlocks presents data on their frequency as obvious evidence of linkage, without benefit of a baseline for comparison.

This study addressed both those issues in a two-stage empirical analysis. The first stage was a disaggregated, firm-by-firm analysis of interlocks in the three industries known to have the largest number of intraindustry interlocks. The second stage of analysis involved the comparison of the frequency of interlocks between firms within a well-linked industry and the frequency of interlocks among an equal number of firms selected randomly.

EMPIRICAL ANALYSIS

Data

The data set used in this study included all interlocks among United States industrial firms in the *Fortune* 500 for 1969. The firms were ranked according to sales in 1969 (*Fortune*, 1970). Originally compiled by a group of researchers led by Schwartz, at the State University of New York at Stony Brook, the data set has been used by Mariolis (1975), Pennings (1980), Mizruchi (1982), Useem (1982), and others. I chose this well-known and widely used data set in order to build on existing research and to ensure against noncomparability of data. To allow a detailed examination of precisely which competing firms were linked with each other, this study focused specifically on the horizontal links in the three industries—chemicals, primary metals, and transportation equipment—singled out by Pennings as the most blatant violators of the Clayton Act.[1]

Stage One: Identifying Interlocks Within Industries

The chemical, primary metals, and transportation industries were defined by two-digit Standard Industry Classification (SIC) codes; the SIC identifications were made using the COMPUSTAT listing for industries, a standard source for SIC information. I assigned the few firms not in the COMPUSTAT listing an SIC classification on the basis of their primary activity, as listed in the 1969 *Moody's Industrial Manual*. The primary activities of most of the firms are easily identifiable, so the firms can be considered to have the same SIC codes used in the Pennings study.

This study's analysis thus began with a definition of an industry consistent with that used by other researchers concerned with interlocking directorates (Pennings, 1980; Pfeffer & Salancik, 1978). As the following discussion will show, however, findings regarding the frequency of interlocks between competitors that are based on two-digit SIC codes can be seriously misleading.

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[1] Pennings' monograph, which Allen called "the definitive study to date on interorganizational interdependence, interlocking directorates, and organization effectiveness" (1983: 1315), offers a level of comprehensiveness not found in other studies, and will therefore be used here as an exemplar of research on interlocking directorates.

Therefore, after classifying the firms by two-digit codes, I grouped them according to four-digit codes, as shown in Table 1.[2]

The identification of the existence of interlocking directorates is rather straightforward and is common to virtually all studies on the topic. A link between two organizations is said to exist when an individual sits on the boards of both organizations. The number of linkages is always counted, so the focus is on dyadic relationships. If a second individual also sits on the boards of the two organizations, a second link exists.

Fifty-three firms were clearly identifiable as belonging to the 2800–2899 SIC group, denoting the chemicals industry, and three additional firms could perhaps be considered part of the group. Since Pennings found 55 chemical firms in the same *Fortune* 500 list, it would appear that, almost without exception, his study and the present study identified the same firms in the same industrial classification, and that approximately the same number of intraindustry links should be observed.

The studies' findings differ substantially, however. Whereas Pennings found 40 links among the 55 firms (presented in his study as an average of .73 horizontal interlocks per firm), only 15 links were observed here, or 16 if the three additional firms are included. This disparity can be explained by the fact that Pennings, for all industries, counted single links between firms as two links. Halving Pennings' total of 40 links for the chemical industry to 20 more closely approaches this study's total.

Clearly, the contrast in the two totals indicates that interlocking activity at the two-digit SIC code level is substantially less frequent than it appears to be from Pennings' report. What is equally if not more revealing, however, is that the 15 actual links in the chemical industry, when analyzed in terms of four-digit SIC codes, offer a picture quite different from that of a well-linked, collusive industry. Among the 16 members of the drugs subgroup (SIC 2830), for example, no links appeared. Among the 18 firms in the chemicals and allied products subgroup (SIC 2800), only one link emerged, between Grace and Sterling.

Where, then, are the linkages? The vast majority of them are *across* four-digit SIC code groupings. Between the subgroup for chemicals and allied products and the drugs subgroup there were 7 links among 34 firms. But even that number misrepresents the number of links between different firms, because 4 of the links are between one pair of firms (Olin and Squibb). Such treatment of multiple-member interlocks between only two firms is typical in research on interlocking directorates. In other words, of the 7 links, only four pairs of firms are involved in actual interlocking (Grace and Sterling, Grace and Schering, Olin and Squibb, and Allied Chemical and Squibb), and a total of only six firms is involved.

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[2] This procedure raises the issue of whether four-digit SIC codes represent an excessively narrow definition of an industry. However, Scherer, an industrial organization researcher quite familiar with defining industries, observed that "more often than not, four-digit Census industries are too *broadly* defined" [emphasis added] (1980: 274).

TABLE 1
Standard Industrial Classification Codes for the Firms Studied

Chemicals

2800: Chemicals and allied products
E. I. du Pont de Nemours & Company
Union Carbide Corporation
Monsanto Company
Dow Chemical Company
W. R. Grace & Company
FMC Corporation
Allied Chemical Corporation
Celanese Corporation
Olin Mathieson Chemical Corporation
American Cyanamid Company
Hercules Inc.
National Distillers & Chemical Corporation
Sterling Drug Inc.
Diamond Shamrock Corporation
Stauffer Chemical Company
Rohm & Haas Company
Pennwalt Corporation
Morton-Norwich Products
2810: Industrial inorganic chemicals
Essex Chemical Corporation
Ethyl Corporation
Air Products & Chemicals, Inc.
2820: Plastic materials and synthetic resin
Reichhold Chemicals, Inc.
2830: Drugs
American Home Products Corporation
Bristol-Myers Company
Warner-Lambert Pharmaceutical Company
Chas. Pfizer & Company, Inc.
Merck & Company, Inc.
Squibb Beech-Nut, Inc.
Eli Lilly and Company
Lever Brothers Company
2830: Drugs (continued)
Abbott Laboratories
Richardson-Merrell, Inc.
Smith Kline & French Laboratories
Miles Laboratories, Inc.
Parke, Davis & Company
Schering Corporating
G. D. Searle & Company
Upjohn Company
2841: Soaps and detergents
Procter & Gamble Company
Colgate-Palmolive Company
Purex Corporation, Limited
2844: Perfumes and cosmetics
Avon Products, Inc.
The Gillette Company
Revlon, Inc.
Chesebrough-Pond's Inc.
Max Factor & Company
2850: Paint, varnish, and lacquers
SCM Corporation
Sherwin-Williams Company
Insilco
Desoto, Inc.
2860: Industrial organic chemicals
Koppers Company, Inc.
2870: Agricultural chemicals
International Minerals & Chemical Corporation
2890: Miscellaneous chemical products
Lubrizol Corporation
Possible inclusions:
Witco Chemical Corporation
Thiokol Chemical Corporation
Chemetron Corporation

Transportation Equipment

3711: Motor vehicles and car bodies
General Motors Corporation
Ford Motor Company
Chrysler Corporation
International Harvester Company
American Motors Corporation
3713: Truck and bus bodies
White Motor Corporation
3714: Motor vehicle parts and accessories
North American Rockwell Corporation
TRW Inc.
Bendix Corporation
Borg-Warner Corporation
3714: Motor vehicle parts (continued)
Eaton Yale & Towne, Inc.
Studebaker-Worthington, Inc.
Dana Corporation
Lear Siegler, Inc.
Budd Company
Fruehauf Corporation
Kelsey-Hayes Company
A. O. Smith Corporation
Federal-Mogul Corporation
Questor Corporation
Maremont Corporation
Sheller-Globe Corporation
Arvin Industries, Inc.

TABLE 1 (continued)

3720: Aircraft and parts
Lockheed Aircraft Corporation
Northrop Corporation
Fairchild Hiller Corporation
Beech Aircraft Corporation
3721: Aircraft
McDonnell Douglas Corporation
Boeing Company
General Dynamics Corporation
Grumman Aircraft Engineering Corporation
Bangor Punta Corporation
Cessna Aircraft Company
3728: Aircraft parts and auxiliary equipment
United Aircraft Corporation
Rohr Corporation

3730: Shipbuilding
Todd Shipyards Corporation
3740: Railroad equipment
American Standard Inc.
Pullman Inc.
General American Transportation Corporation
ACF Industries, Inc.
Amsted Industries, Inc.
3760: Guided missles
Martin-Marietta Corporation
Thiokol Chemical Corporation
Possible inclusions:
Bath Industries, Inc.
Houdaill Industries, Inc.

Primary Metals

3310: Blast furnace and steelworks
United States Steel Corporation
Bethlehem Steel Corporation
Armco Steel Corporation
Republic Steel Corporation
National Steel Corporation
Inland Steel Corporation
Crane Company
Allegheny Ludlum Steel Corporation
Wheeling-Pittsburgh Steel Corporation
Kaiser Steel Corporation
Interlake Steel Corporation
H. K. Porter Company, Inc.
NVF Company
Cyclops Corporation
McLouth Steel Corporation
Penn-Dixie Cement Corporation
Keystone Consolidated Industries, Inc.
Schaefer
3320: Iron and steel foundry
Midland-Ross Corporation
3330: Primary smelting/refining nonferrous metals
Aluminum Company of American
Reynolds Metals Company

3330: Primary smelting (continued)
Kaiser Aluminum & Chemical Corporation
3341: Secondary smelting/refining nonferrous metals
Diversified Industries, Inc.
Harsco Corporation
United States Smelting Refining & Mining Company
American Smelting and Refining Company
3350: Rolling and drawing, nonferrous metals
Revere Copper & Brass, Inc.
Handy & Harman
Cabot Corporation
Easco Corporation
Triangle Industries, Inc.
3390: Miscellaneous primary metal products
Chromalloy American Corporation
Possible inclusions:
Howmet Corporation
Cerro Corporation

The remaining 8 links can be broken down as follows: Procter and Gamble, with an SIC code of 2841, for soaps and detergents, is linked with Lilly (2830, drugs), with Sherwin-Williams (2850, paints, varnish, and lacquers), and with Koppers (2860, industrial organic chemicals); Colgate-Palmolive, another soap and detergent manufacturer, is linked with National Distilleries (2800, chemicals and allied products); Purex, a third soap and detergent manufacturer, connects with Max Factor (2844, perfumes and cosmetics); Bristol-Meyers, a drug firm, is linked with Koppers; Searle, another drug firm, is linked with Desoto (2850, paints, varnish, and lacquers); and finally, Diamond Shamrock (2800) is linked with Sherwin-Williams.

In examining those links, it appears clear that the participating firms can scarcely be considered competitors in their primary activities. In general, the links seem to be haphazardly distributed across the various four-digit SIC codes; the only pattern that clearly emerges is the lack of interlocking behavior within the two main industry groups, chemicals and allied products (2800) and drugs (2830).

The second allegedly well-linked broadly defined industry is transportation equipment (SIC codes 3711–3760); 43 firms were clearly identified as members of those SIC groups, with two firms as possible members. The number of links was only 14, regardless of the inclusion or exclusion of the two questionable firms. The transportation firms can be further broken down into three subgroups based on three-digit SIC codes. SIC 371X contains producers of automobiles, trucks, and buses; SIC 372X includes aircraft, and SIC 373X to SIC 379X contains other forms of transportation equipment. Of the 14 links observed in the industry as a whole, only 4 are within the automotive group, which consists of 24 firms. But not even all of those 4 links appear to be horizontal; they are between General Motors, with a four-digit code of 3711, and Bendix, with 3714; White Motors, 3713, and North American Rockwell, 3714; Eaton Yale, 3714, and Studebaker-Worthington, 3714; and Eaton Yale and Fruehauf, 3714. General Motors' SIC code is the one for producers of car and truck bodies, White Motors' SIC code is for truck and bus bodies, and the other firms fall under the SIC classification for motor vehicle parts and accessories. In other words, of the 4 automotive group links, 2 would be more accurately classified as vertical. In the 12-firm aircraft group, only 1 link, an apparently vertical one, emerged—between General Dynamics (3721, aircraft) and Rohr (3728, aircraft parts and auxiliary equipment).[3]

How then are the remaining 9 links explained? Two links are between automotive and aircraft groups (Borg-Warner and United Aircraft, and Bendix and Rohr); 5 are between automotive and railroad (3740) equipment groups (Ford and Pullman, International Harvester and General American Transportation, and TRW and American Standard); 1 is within the railroad equipment group (Amsted Industries and General American Transportation); and 1 is between the aircraft and the railroad equipment groups (General Dynamics and Pullman). It seems clear that these links are not among firms that are competitively interdependent in the same industries; instead, one sees a mixture of types of linkages, most of which are scattered across SIC codes.

The third industry examined was primary metals, covering SIC codes 3310–3390. A total of 32 firms were identified, among which there were only 7 links. Also, 2 additional firms that possibly merited inclusion had 2 additional links. However, a closer examination revealed that the firms can be divided into two somewhat homogeneous groups: steel and nonferrous metals. Among the 19 firms in the steel group, 3 links existed, involving only two sets of firms: Crane and Porter had 2 links, and Interlake Steel and Midland Ross had 1. No links appeared among the nonferrous metal producers. Of the remaining links, 1 was between the Bethlehem Steel, which has the four-digit code 3310, and Triangle Industries, whose SIC code is 3350, for the rolling and drawing of nonferrous metals, and three were between steel and aluminum manufacturers, with Armco Steel (3310) and Alcoa (3330) accounting for 1 and Kaiser Steel (3310) and Kaiser Aluminum (3330) accounting for 2. Again, the data do not convey the image of an industry tightly connected by interlocking directorates.

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[3] This is not to suggest that vertical links are more prevalent than horizontal ones, but rather to show that some interlocks previously viewed as horizontal are not.

Stage Two: Comparative Analysis

This stage of analysis involved comparing the frequency of interlocking directorates in the best-linked industry with that in a random sample of industries. If interlocking directorates facilitate interorganizational coordination and collusion, interlocks should be more frequent among firms that would clearly benefit from such relationships—strategically interdependent firms in the same industry—than among a similarly sized set of firms selected randomly from all industries represented in the *Fortune* 500. There appear to be no major deterrents to interlocks to diminish that likelihood, suggested by the almost nonexistent enforcement of the Clayton Act restriction on interlocks (Zajac, 1988). Finding no difference in the level of frequency of interlocks in the two groups would suggest that intraindustry interlocks might have no particular meaning in terms of interorganizational relations.

In order to bias the test conservatively toward finding more interlocks among related than among unrelated firms, I chose the related set from the chemical industry, which was shown in the initial analysis to have the most interlocks. For the control group, 53 firms were chosen at random from the same data set initially employed, the *Fortune* 500 for 1969. To best quantify the random model, I selected 50 random samples of 53 firms each. In the initial analysis, 15 interlocks were identified among the 53 firms in the chemicals industry (as defined by two-digit SIC code). The average number of links in the 50 random groups of 53 firms was 16. The findings therefore suggest that the frequency of interlocking in a horizontally related set of firms is the same as that which can be expected in an equally sized set of unrelated firms.

In a final empirical comparison, interlocks among the related and randomly selected firms were extended to include indirect interlocks. An indirect interlock is said to exist when board members of firms A and B do not sit on each other's board but sit on a common third firm's board. The results were virtually the same as those of the first comparison: the 53 firms in the chemicals industry exhibited 116 indirect links, and the random sets had an average of 109 links (116 falls within a 95 percent confidence interval for 109). This result again suggests that interlocks do not primarily serve as links, as is so often assumed. It is also interesting to note that if the frequency of indirect interlocks among the firms in the chemical industry had been presented without the benefit of a control group comparison, the number would appear to be substantial.

Although the frequency of interlocking behavior may not actually represent the degree to which interlocks are used to serve interorganizational purposes, determining frequency has formed the basis for virtually all research on interlocks. Dooley (1969), for example, viewed frequent interlocks as providing a framework for collusion, and Burt referred to the links as a "conduit for information" (1980: 565).

It would appear, then, that the results of both the disaggregated, firm-by-firm analysis and the comparative analysis suggest that interlocking directorates among competing firms are not significant in number and probably not significant in meaning. It is therefore not surprising that Pennings, one of the only researchers who actually tested for consequences of intraindustry interlocking in terms of financial performance, obtained results that are "incongruent with the view that interlocking implies collusive or conspirational behavior" (1980: 165). In his study, the relationship of performance and industry interlocks was not even in the predicted direction.

DISCUSSION

This study's analysis of interlocks across boards of directors in allegedly well-connected industries was highly detailed to permit unambiguous examination of each individual link. Considering the primary activities of each firm involved in each interlock supported the hypothesis that direct and indirect interlocks previously viewed as horizontal are infrequent and are randomly distributed over a range of primarily noncompeting firms. Identification of individual firms alleged to be competitors revealed that, because of problems in industry definition, most interlocks previously identified as between competitors are actually between noncompeting firms. In addition, comparing the incidence of interlocks in allegedly collusive industries with that in a control group of firms suggested that the incidence of interlocking among competitively interdependent firms is no greater than that predictable by chance. Given that data on the frequency of interlocks and industry definition often form the basis for aggregate analyses—for example, in correlation with other structural variables—the findings of this study suggest that the foundations for aggregate analyses may be less than solid. Indeed, aggregate findings may actually obscure rather than illuminate.

The findings presented here do not support the interorganizational linkage perspective on interlocking directorates. The focus on horizontally interdependent firms enabled a direct test of this perspective. In research on interlocks, however, there currently exists only one major alternative theoretical perspective: the class alliance view, in which board members are viewed as using interlocks to further their elite class interests. Indeed, Ornstein described the class alliance view as "the major theoretical alternative to the interorganizational approach" (1984: 210). Unfortunately, methods for testing notions of intraclass alliance using data on interlocks are highly elusive. Ornstein (1984), for example, attributed the existence of interlocks not traceable to corporate or interorganizational purposes to intraclass alliances.[4] He did this both for his study and for that of Palmer (1983), who found that interlocks ostensibly serving to coordinate action between firms are usually not replaced when they are broken.[5]

One option for interpreting this study's results is to follow Ornstein's lead and to view the findings as evidence of intraclass alliance—by default. But are there no plausible alternative models consistent with the arguments and findings presented here? Another study of mine (Zajac, 1988) offered one such model. In a critique of both the interorganizational and the class alliance views of interlocking directorates, it proposed a personal advancement model that emphasizes economic incentives, a desire for prestige, and career objectives as motivating individual board members to hold multiple board memberships. In that study I also argued for alternative methodologies for research on interlocks, advocating qualitative empirical approaches like interviewing and participant observation. Future research on boards of directors may benefit from such an alternative theoretical and empirical approach.

CONCLUSIONS

This study raises several problematic issues regarding the prevailing approach to research on interlocking directorates. It points to a need for greater theoretical and methodological diversity in studying multiple board memberships. Challenging conventional approaches to the study of interlocks may lead to a fuller understanding of both single and multiple board membership.

More generally, the findings imply that researchers interested in interorganizational strategies may need to establish carefully whether a phenomenon under study actually represents an interorganizational strategy (Zajac, 1986). An important first step is identifying the primary function of that strategy. In the case of interlocks, the results of the present study suggest that the existence of the interorganizational function of board interlocks has typically been assumed rather than established.

Finally, the present findings suggest that organizational researchers should be sensitive to the need to establish baseline data for interpreting results in other areas of organizational research. Otherwise, the significance of the occurrence of a nonroutine organizational event is difficult to assess.

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[4] Palmer, Friedland, and Singh (1986) saw the two perspectives as interrelated.

[5] Ornstein did find a higher rate of "reconstitution" of broken links, but admits "to the possibility of a methodological artifact accounting for the difference" (1984: 229). Despite using 34 independent variables, Ornstein was only able to explain 15.4 percent of the variance in reconstitution. The variable of reconstitution is clearly not well understood.

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SUPERVISORY LEADERSHIP AND SUBORDINATE BURNOUT

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Theoretical models (Numerof, 1983; Perlman & Hartman, 1982) of burnout have cited the importance of supervisory behavior as a factor both contributing to and mitigating the deleterious effects of organizational role stressors. Golembiewski, Munzenrider, and Stevenson (1986) developed a general model of burnout suggesting that poor work-site conditions modified by workgroup and personal characteristics lead to burnout and such other consequences as physical symptoms, poor performance, and low productivity. They hypothesized that "burnout gets induced by immediate supervisory styles and practices, as moderated by personal characteristics" (1986: 181) and found a significant difference between low- and high-burnout groups on a scale measuring supervisory support. They also reported substantial effects for other aspects of immediate workgroups, including employees' job involvement, work pressure, and clarity of tasks and roles. Rountree (1984) found that there was a strong tendency for people in a task group to have similar levels of burnout. An obvious implication is that a group supervisor's behavior may be an important factor.

Although leadership is often mentioned, only a few studies appear to have systematically measured supervisory behavior in relation to subordinate burnout. For example, a study of nurses (Duxbury, Armstrong, Drew, & Henly, 1984) found a significant correlation of burnout with consideration (−.29) but not with initiating structure (.07). Further analysis that categorized the supervisors as high or low on each dimension indicated a significant interaction effect, with the highest level of burnout occurring for individuals whose supervisors were rated as low in consideration and high in initiating structure. In a study of teachers, Herman (1983) found that men with considerate supervisors had lower depersonalization scores than men whose supervisors were less considerate. Singer (1984) reported that teachers' frustration and alienation were negatively related to both consideration and initiating structure. A weakness of the three studies is that they included few supervisors (14, 4, and 10, respectively). It is difficult to generalize from such small samples.

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Other studies have provided further evidence that burnout is related to supervisory behavior, especially to consideration. An inverse relationship between supervisory support and burnout has been noted (Constable & Russell, 1986; Russell, Altmaier, & Van Velzen, 1987), which suggests that consideration will be inversely related to burnout. Burke, Shearer, and Deszca (1984) found a significant positive correlation (.36) between burnout and a scale measuring poor leadership that appeared to include items similar to items measuring initiating structure and consideration.

The relationship of initiating structure and burnout may be complex. The absence of structure may create high ambiguity, which is known to be a stress factor (Matteson & Ivancevich, 1979; Numerof & Abrams, 1984). However, too much structure, particularly for managers and other trained professionals, may mean low autonomy which, in turn, leads to high burnout (Golembiewski et al., 1986; Numerof, 1983). Thus, we might expect high burnout to be associated with either high or low levels of initiating structure.

THEORETICAL RELATIONSHIPS

The purpose of the current study was to investigate how the leadership behavior of a large number of supervisors, as measured by consideration and initiating structure scales, was related to their subordinates' reported burnout. We hypothesized that there would be an inverse relationship between consideration and burnout and a curvilinear relationship between initiating structure and burnout. Further, we hypothesized that when leader behavior was added to the regression equation, there would be a substantial increase in the amount of variance of burnout that could be explained above that explained by the following variables: age, marital status, experience, formalization, and holding a supervisory position. We chose that set of variables on the basis of previous research (cf. Numerof & Gillespie, 1984).

Variables

Age. An inverse relationship between age and burnout (Golembiewski et al., 1986) was hypothesized. As people get older, they may develop better coping skills or more realistic expectations of what they will be able to accomplish.

Experience. The negative association of years of experience, represented here by years with a present organization, and burnout may be a function of age, or it may be that individuals who find a particular working environment highly stressful are more likely than others to leave over a period of time (Berkeley Planning Associates, 1977; Numerof, 1983: 172). On the other hand, Golembiewski and colleagues (1986) found a curvilinear relationship in which people with fewer than two or more than ten years of service had the lowest burnout. Whitehead (1985) also reported a curvilinear relationship between the two variables. We hypothesized such a relationship.

Marital status. Marriage may provide one form of social support that can counteract a tendency toward total detachment or toward overinvolvement with a job (Shubin, 1978); thus, we hypothesized lower burnout for married than for unmarried people (Golembiewski et al., 1986).

Position. People in frontline, nonsupervisory positions may be more prone to burnout than those in supervisory and administrative positions because the latter may more easily be able to rationalize that problems result from inadequacies of lower-level employees. Similarly, lack of adequate procedural and administrative support from supervisors may make lower-level employees more vulnerable to stress (Numerof & Abrams, 1984). Golembiewski and colleagues (1986) found that people higher in status had less burnout than those lower in status. We hypothesized that nonsupervisory employees would report more burnout than would supervisors.

Formalization. A positive relationship between highly formalized organizational work environments and burnout was hypothesized because burnout may increase where professional decision making is controlled more by administrative policy than by professional judgments (Cherniss, 1980).

Gender. The findings of empirical studies with regard to gender have been equivocal. Cahoon and Rowney (1984) reported that managers who were men had more burnout, but Golembiewski and colleagues (1986) found that they had less. A recent study of claims and service representatives (Maslach & Jackson, 1985) found no significant relationship between burnout and gender. Consequently, we did not make any predictions about the relationship of burnout and gender.

METHODS

Respondents

Data were collected by mailing an instrument to 875 part-time M.B.A. students in a university in a northeastern city. They were asked to respond to questions about their own levels of burnout and about the leadership behaviors of their current immediate supervisor. We received 256 usable questionnaires, a 29 percent response rate. It was known that in this M.B.A. population, the mean age was 31.1 years, 69 percent were men, and 53 percent were married. For the respondents, the mean age was 31.3, 66 percent were men, and 60 percent were married. To further assess the possibility of response bias, we examined a random sample of 100 student records and found that 52 percent had supervisory positions. That figure corresponded adequately to the 56 percent of respondents who indicated that they were in supervisory positions.

Measures

Burnout. The Gillespie-Numerof Burnout Inventory (GNBI) (Gillespie & Numerof, 1984), form A, was administered, and a mean of the ten items was calculated ($\alpha = .94$). The GNBI appears in the Appendix.

Leadership behaviors. The Leader Behavior Description Questionnaire's (Stogdill, 1963) scales of initiating structure and consideration were used, and a score was calculated by taking the mean of the ten items for each ($\alpha = .85$

and .91, respectively). A sample item for initiating structure was "Lets group members know what is expected of them," and a sample item for consideration was "Looks out for the personal welfare of group members."

Formalization. Hage and Aiken's (1969) formalization scale, as modified by Numerof and Gillespie (1984), was used, and a mean of the six items was calculated ($\alpha = .74$). Sample items were "Everyone has a specific job to do" and "We are to follow strict operating procedures at all times."

Individual characteristics. Respondents were asked their gender, marital status, age, whether their job had supervisory responsibility, and the number of years they had been with their present organization.

RESULTS

Table 1 presents the means, standard deviations, and intercorrelations found for the burnout, leadership, and formalization measures and the individual characteristics. We performed a hierarchical regression analysis (Cohen & Cohen, 1975) to test the hypothesis that the leadership dimensions added to our understanding of factors related to burnout. First, we used the individual characteristics and formalization measures as independent variables in a regression equation with burnout as the dependent measure; only 2 percent of the variance was explained. For the second step in the hierarchical regression, the initiating structure and consideration measures were added to the equation, and an additional 31 percent of the variance was explained. Table 2 shows how the separate measures and individual characteristics contributed to explaining burnout. Respondents who were married reported lower burnout than those were not. Also, respondents whose supervisor was

TABLE 1
Means, Standard Deviations, and Intercorrelations of All Variables[a]

Variables	Means	Standard Deviations	1	2	3	4	5	6	7	8
1. Burnout	2.38	21.48								
2. Initiating structure	3.39	6.77	−.15							
3. Consideration	3.19	8.27	−.55	.50						
4. Age	31.34	9.77	−.10	−.11	.06					
5. Years in organization	5.43	4.23	.04	−.12	−.04	.68				
6. Marital status[b]	1.60	0.48	−.09	−.11	−.08	.24	.25			
7. Position[b]	1.44	0.42	.04	.06	.00	−.22	−.20	−.16		
8. Formalization	2.79	0.54	−.04	.44	.16	−.11	.00	−.04	.03	
9. Gender[b]	1.34	0.48	.03	.04	.07	−.14	−.12	−.35	.08	−.02

[a] $N = 256$; correlations above $r = .10$ are significant at $p < .05$, correlations above $r = .14$ are significant at $p < .01$.

[b] Dummy variables with 1 = nonmarried, 2 = married; 1 = nonsupervisory, 2 = supervisory; and 1 = man, 2 = woman, respectively.

TABLE 2
Results for Hierarchical Regression Analysis of Burnout[a]

Variables	Step 1	Step 2
Age	−.090	−.109
Years in organization	.223**	.145*
Marital status	−.230**	−.122*
Position in organization	.024	.014
Formalization	−.066	−.028
Gender	−.011	.020
Initiating structure		.169*
Consideration		−.629***
Adjusted R^2	.019	.330***
Change in R^2		.311***

[a] Beta weights reported in the table.
* $p < .05$
** $p < .01$
*** $p < .001$

rated high in consideration or low in initiating structure reported lower burnout. There were no relationships between burnout and age, gender, position, or formalization. Contrary to prediction, respondents who had more experience reported more burnout.

To test the hypotheses that years of experience in an organization and level of initiating structure would have curvilinear rather than direct effects, we created polynomial terms by squaring the scale scores and added those terms to the regression equation. Experience ($F = .78$) and initiating structure ($F = .96$) each contributed less than .003 to the variance explained, and neither was statistically significant.

To investigate further how leader behaviors were related to burnout, we trichotomized the initiating structure and consideration scales and classified respondents as high, moderate, or low on each. An analysis of variance was performed. Table 3 gives results. Consideration had a significant main effect, but initiation did not. There was some indication of an interaction effect. The lowest burnout was associated with high initiation and high consideration and the highest burnout was associated with high initiation and low consideration.

DISCUSSION

This study, having used a larger group of supervisors than had previous research, confirmed the inverse relationship between consideration and burnout. Individuals who rated their supervisor high on consideration also reported low burnout. For initiating structure, there was a direct relationship rather than the curvilinear relationship that we had predicted. It is possible that the loss of autonomy that came from having a highly structuring supervisor, especially when coupled with low consideration, may have been

TABLE 3
Results for Analysis of Variance for Burnout

	Low Consideration		Moderate Consideration		High Consideration			
Variables	Means	*N*	Means	*N*	Means	*N*	Mean Squares	*F*
Low initiating structure	3.05	48	2.20	27	2.14	7		
Moderate initiating structure	3.21	22	2.33	41	1.54	29		
High initiating structure	4.22	15	2.36	20	1.44	47		
Initiating structure							1.82	0.91
Consideration							48.73	24.28***
Initiating structure × consideration							3.97	1.98†

† p < .10
* p < .05
** p < .01
*** p < .001

an important contributor to burnout. On the other hand, the suggestion that low initiating structure would create ambiguity and thus be associated with burnout received no support. The respondents in this study may not have felt ambiguity, or it may not have contributed to their level of burnout. The current results coupled with the lack of clear previous research findings indicates that further study of the relationship of initiating structure and burnout is needed.

The results for years of experience showed a direct effect rather than the curvilinear effect that we had predicted. It is likely that the rather narrow age range of our population bounded the variable "years in the organization." Only 15 percent had ten or more years of experience. Thus, although previous research has suggested a curvilinear effect, we were only likely to find that new employees experienced little burnout.

As with all correlational research, a limitation of this study is that causality of relationships could not be determined. We assumed that leader behavior could affect subordinate burnout. However, we could not discount the possibility that individuals suffering from burnout reduce their appraisal of their supervisors' consideration. Longitudinal research could clarify this relationship. Also, while the GNBI provided a straightforward measure of burnout in this study, it should be investigated further, especially in relationship to the Maslach Burnout Inventory (Maslach & Jackson, 1981) and to Golembiewski and colleagues' (1986) phase model.

It is difficult to understand why supervisory leadership behavior has been such a neglected variable in what is otherwise a rather extensive literature on burnout. The 31 percent of additional variance explained by leader behavior in this study argues strongly that future research should look more directly at the behavior of supervisors. Simply including a scale of supervisory support may not capture the important relationship of burnout and leader behavior. Future studies should also investigate levels of burnout across the members of individual work groups (Rountree, 1984), the nature of the tasks performed (Eisenstat & Felner, 1984; Golembiewski et al., 1986), and the possibility that social support can moderate the relationship of leader behavior and burnout.

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APPENDIX

The Gillespie-Numerof Burnout Inventory, form A,[a] consists of the following ten items using an 8-point response format with anchors of 7 = always, 4 and 3 = sometimes, and 0 = never.

I'm fed up with my job.
I feel crabby at work.
I feel that everything is caving in at work.
I feel unable to get out from under my work.
I'm discouraged about my work.
I feel buried in my job.
I feel like giving up on the job.
I'm disillusioned with my work.
My job makes me angry.
My job has me at the end of my rope.

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